Appendix H

Biological Survey Report for
Tri-State Generation & Transmission's
Proposed San Juan Basin Energy
Connection Project in
San Juan County, New Mexico

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1.0 Introduction

On behalf of Tri-State Generation & Transmission Association, Inc. (Tri-State), Stratified Environmental & Archaeological Services, LLC (SEAS) and URS Corporation (URS) conducted a biological inventory, field survey, and data review for sensitive, threatened, and endangered species habitat on the New Mexico portion of Tri-State's proposed San Juan Basin Energy Connection (SJBEC) Project. The proposed project passes through Bureau of Land Management (BLM) Farmington Field Office (FFO), State of New Mexico, and private lands in San Juan County, New Mexico. Increasing electric load growth in the San Juan Basin region of Colorado and New Mexico in the commercial, residential, and industrial sectors has put a strain on Tri-State's existing electrical system. Although the current generation resources throughout the region are adequate to meet near-term load growth, additional transmission facilities are needed to ensure that power can be reliably delivered. As proposed, the SJBEC Project would relieve transmission constraints and improve the power delivery infrastructure in the San Juan Basin region of Colorado and New Mexico. The SJBEC will serve expanding electric loads of Tri-State's member co-operative, La Plata Electric Association (LPEA), among others.

The portion of the SJBEC project located in New Mexico was inventoried between October 23 and November 29, 2012, with Mindy Paulek of URS addressing faunal resources and Doug Loebig of SEAS investigating floral resources. This biological survey investigation was conducted to assess the current state and nature of biological resources within the project area and to make recommendations for further biological fieldwork. SEAS returned to the project area in the spring of 2013 to conduct intensive rare plant surveys in identified suitable habitat and for additional vegetation mapping. This report also provides background information on threatened and endangered species. However, a separate biological assessment (BA) is currently being prepared by Parametrix in support of the SJBEC which specifically analyzes possible effects of the proposed SJBEC Project on species listed as threatened, endangered, proposed, or candidate under the Endangered Species Act (16 [United States Code] USC 1531 et seq.) of 1973 (ESA).

The U.S. Fish & Wildlife Service (USFWS), the New Mexico Department of Game and Fish (NMDGF), BLM and other rare species databases were consulted to assemble a list of protected and sensitive species with potential to occur within San Juan County, New Mexico. In addition, data were gathered to address plant community types, potential wetlands, prairie dog complexes, migratory bird species, and the presence of active mammal dens. John Kendall, Wildlife Biologist for the BLMFFO, was also consulted. During the prefield records review, the BLM and USFWS noted known habitat or occurrences of threatened and endangered species in the proposed project area. A detailed analysis of the effects to these species is covered in the aformentioned BA currently being prepared under separate cover, although recommendations are provided here as well. During the biological field survey of the project area, SEAS and URS documented habitat types and compiled lists of all plant and animal species observed.

2.0 Project Description

Tri-State's proposed SJBEC Project, which falls on BLM, New Mexico State Trust lands, private, and Southern Ute Indian Reservation (SUIR) lands, runs approximately 65 miles southwest to northeast from the proposed new Three Rivers substation near Fruitland, New Mexico to the existing Iron Horse

Substation north of Ignacio, Colorado. As the project includes federal lands and permits, along with federal funds provided by the Rural Utilities Service (RUS), the undertaking is subject to compliance with the National Environmental Policy Act (NEPA), ESA, and Section 106 of the National Historic Preservation Act (NHPA), among other federal, state, and tribal laws and regulations. The BLM is acting as the lead federal agency for the Environmental Impact Statement (EIS) and all other relevant regulatory obligations. The following report details the work conducted on BLM, New Mexico State Trust, and private lands in San Juan County, New Mexico. The proposed project in New Mexico begins at a location north of Fruitland near the existing Shiprock substation managed by Western Area Power Administration (Western) and ends at the New Mexico-Colorado state line west of the Animas River.

The total project within New Mexico consists of 41.6 linear miles of new transmission infrastructure; access roads account for another 143.6 miles, although only 40.2 miles reflect roads to be improved (25.4 miles) or proposed new roads (14.8 miles) that would be part of the SJBEC project (Table 2.1; Figures 2.1 to 2.22). The remaining access utilizes existing infrastructure built to support the oil and gas industry, existing transmission lines, ranching, recreation, and other activities. The BLM and cooperating agencies defined the project area as the proposed transmission-line right-of-way, access-road rights-of-way, and any temporary use areas (TUAs). In addition, a 50-foot buffer zone was examined around all project components. The project area totals roughly 1,510 acres on BLM lands, 793 acres (ac) on private lands, and 311 ac on New Mexico State Trust lands. Surveys were conducted of the entire project area in New Mexico—a total of 2,614 ac. The permanent right-of-way easement proposed for the SJBEC transmission line is 150 feet (ft) wide and includes approximately 463 ac of BLM lands, 229 ac of private lands, and 66 ac of New Mexico State Trust lands.

Tri-State, its member co-operative, LPEA, and other regional utilities have been making improvements and additions to the electric system in the San Juan Basin over the years to maintain reliability. While improvements have helped, the need to improve electrical growth and reliablity in the region to meet the needs of growing communities and industries has resulted in the proposal to construct the SJBEC project—a new 230-kilovolt (kV) transmission line. This followed intensive engineering studies, consultation with other regional providers and electric cooperatives, a detailed alternatives analysis, public outreach/scoping, route refinement workshops, and agency consultation.

Table 2.1 Project Area Information

SJBEC Description	*BLM*	*Private*	*NM State Trust*	*Total*
Miles of proposed transmission line in New Mexico	25.4	12.6	3.6	41.6
Miles of access roads in New Mexico	80.0	44.5	19.1	143.6
Miles of existing access roads with no proposed improvements	57.5	33.7	12.2	103.4
Miles of existing access roads with proposed improvements	14.2	6.0	5.2	25.4
Miles of proposed new access roads	8.3	4.8	1.7	14.8

Figure 2.1 General Project Vicinity Map

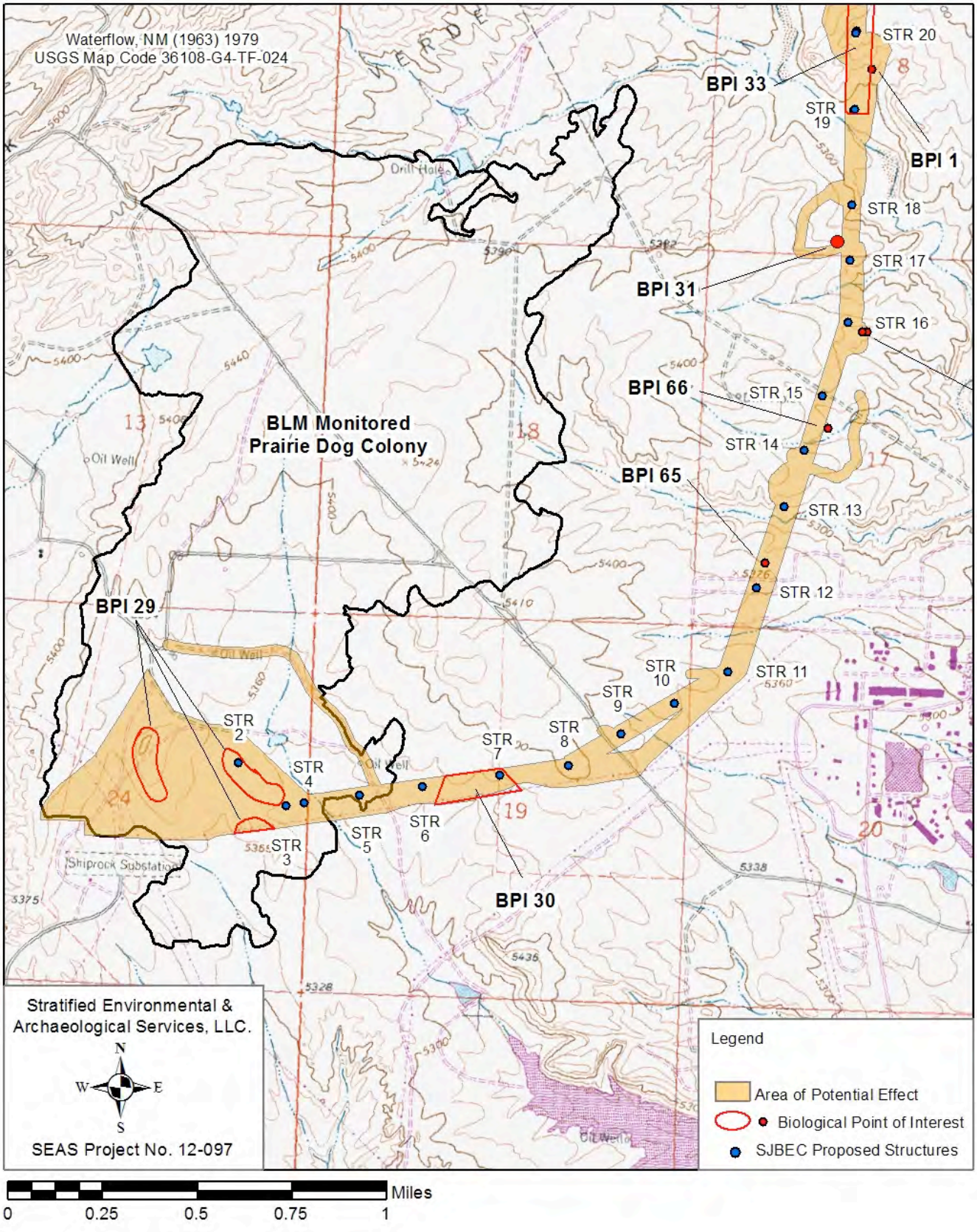

Figure 2.2 Project Location Map 1: Waterflow, NM (1963) 1979 USGS 7.5' Series Quadrangles (1: 24,000 Scale)

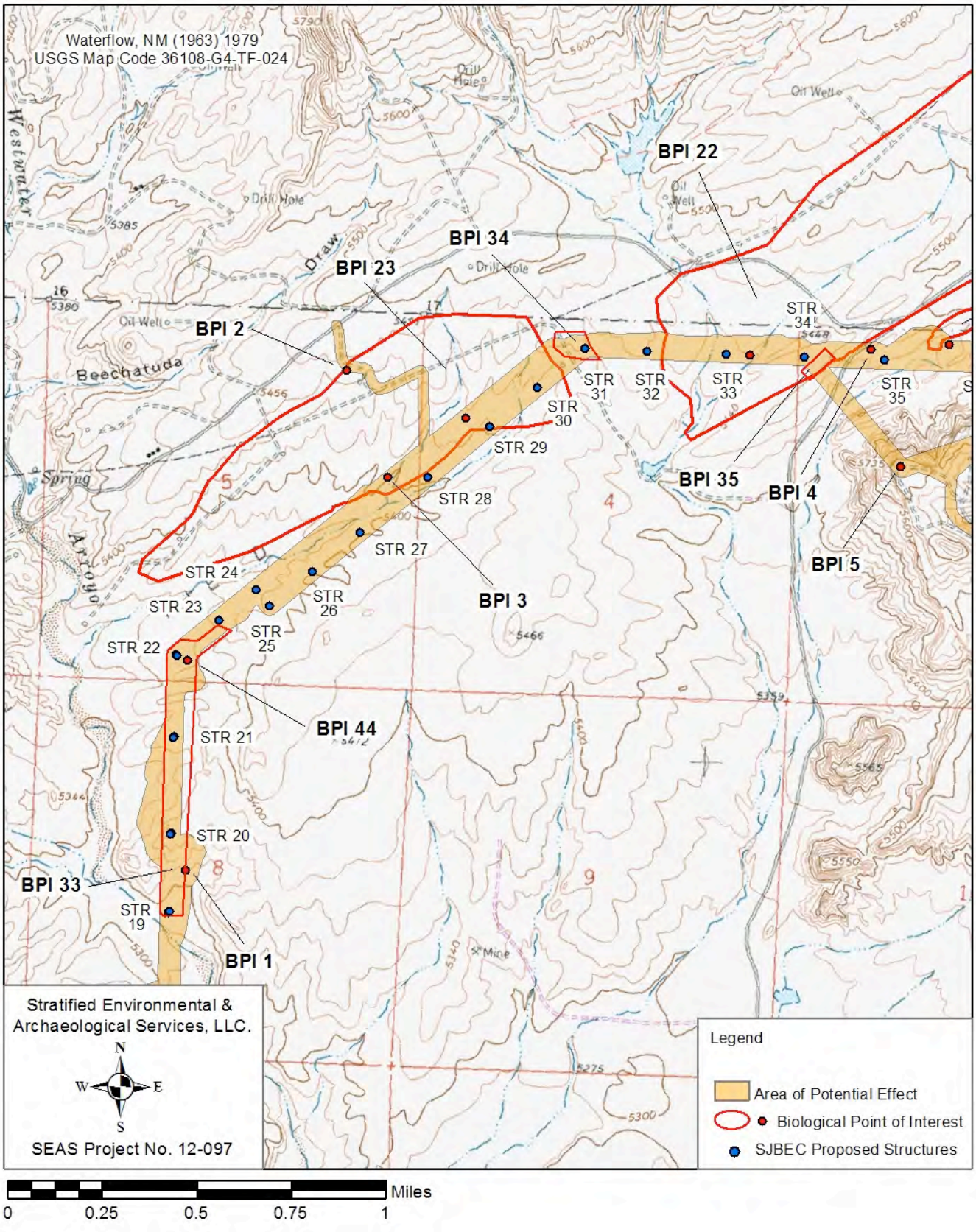

Figure 2.3 Project Location Map 2: Waterflow, NM (1963) 1979 USGS 7.5' Series Quadrangle (1: 24,000 Scale)

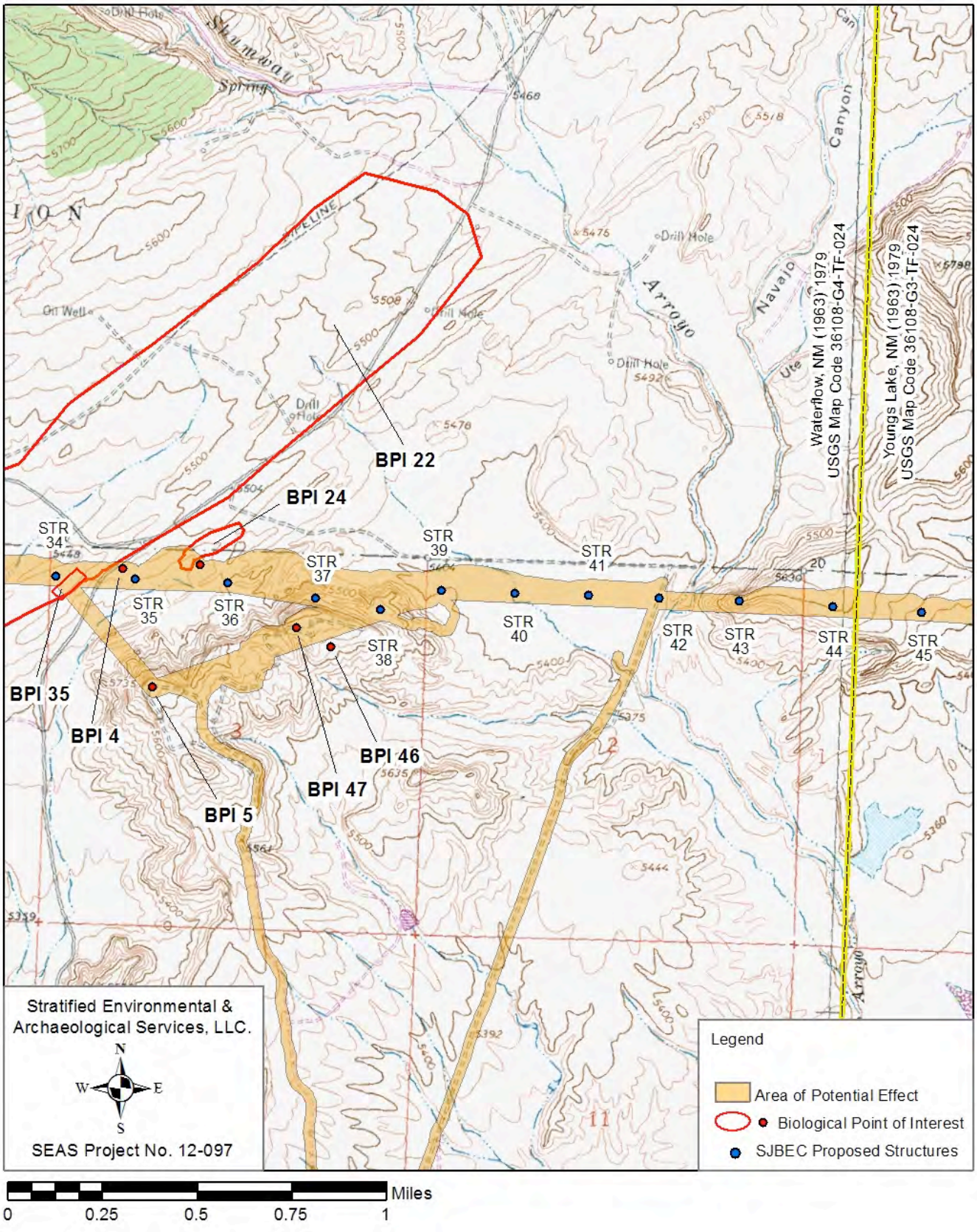

Figure 2.4 Project Location Map 3: Waterflow, NM (1963) 1979 and Youngs Lake, NM (1963) 1978 USGS 7.5' Series Quadrangles (1: 24,000 Scale)

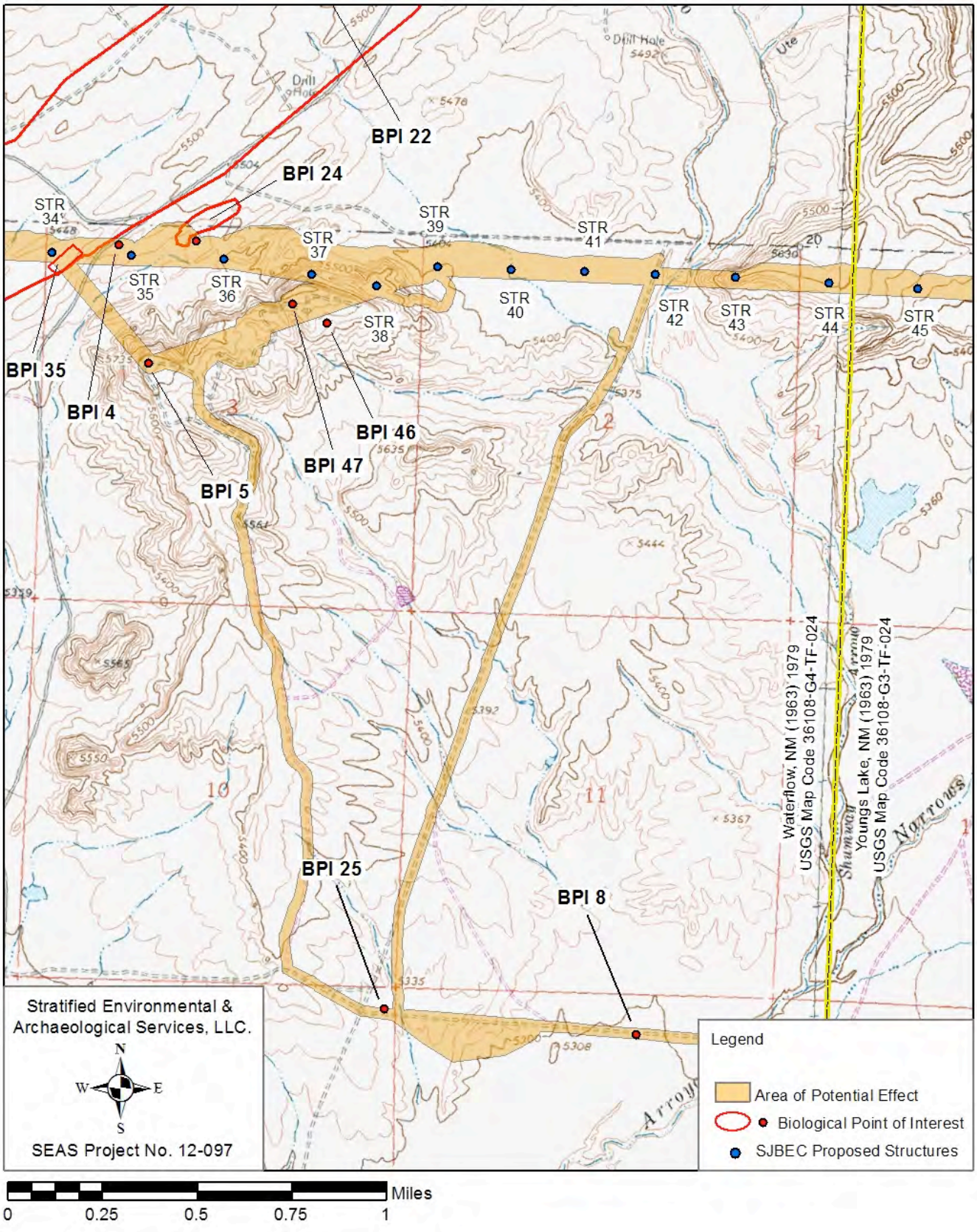

Figure 2.5 Project Location Map 4: Youngs Lake, NM (1963) 1979 USGS 7.5' Series Quadrangle (1: 24,000 Scale)

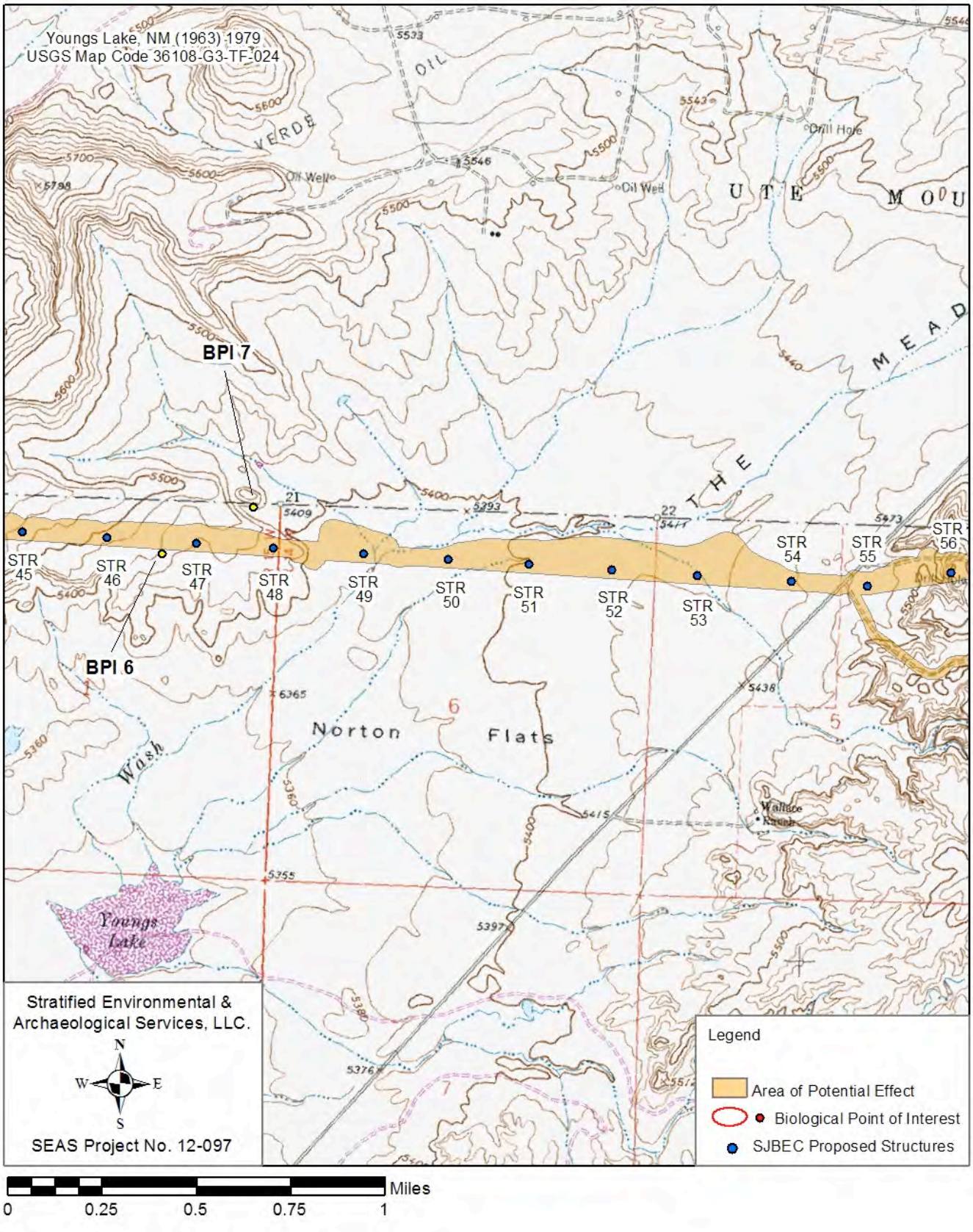

Figure 2.6 Project Location Map 5: Youngs Lake, NM (1963) 1979 USGS 7.5' Series Quadrangle (1: 24,000 Scale)

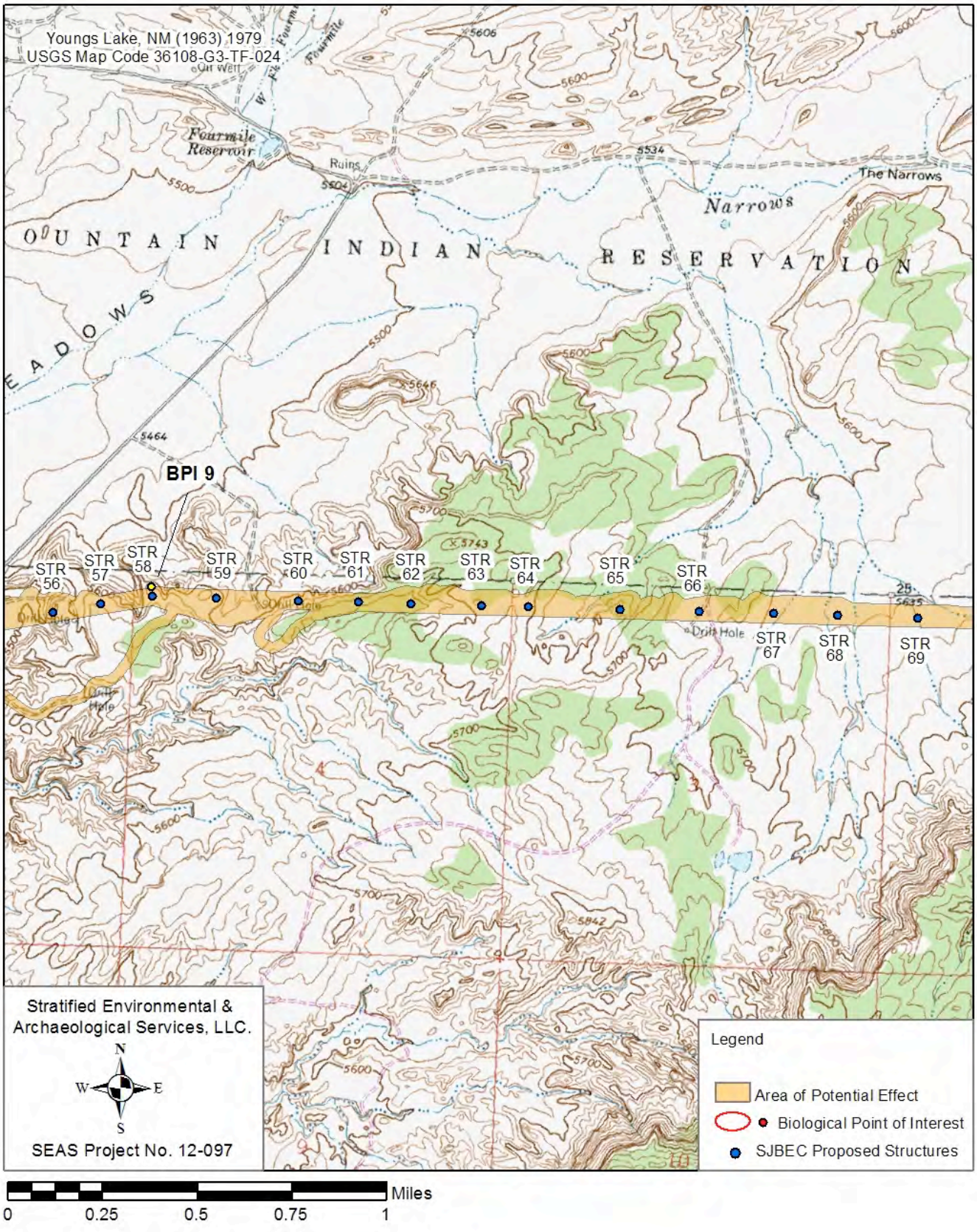

Figure 2.7 Project Location Map 6: Youngs Lake, NM (1963) 1979 USGS 7.5' Series Quadrangle (1: 24,000 Scale)

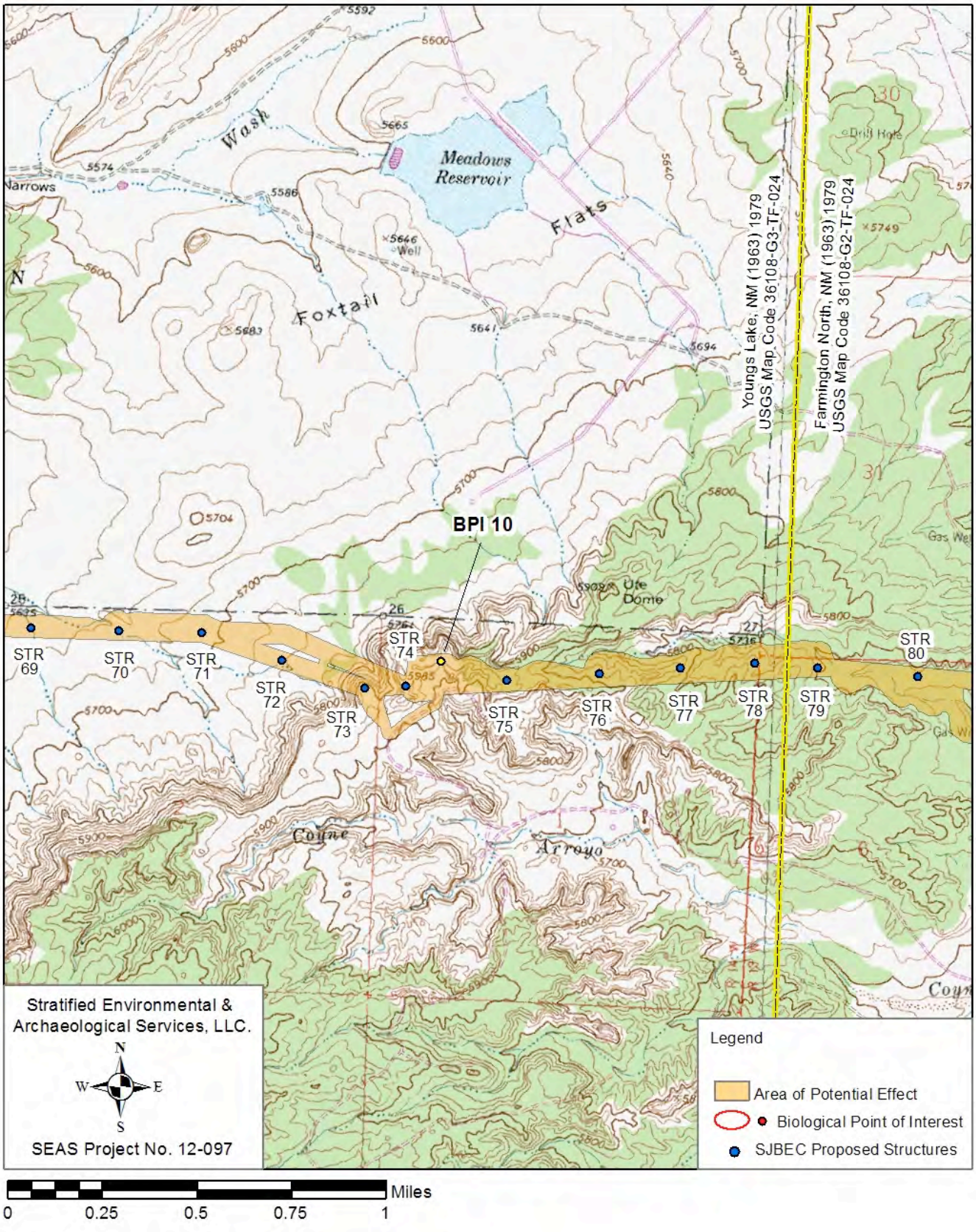

Figure 2.8 Project Location Map 7: Youngs Lake, NM (1963) 1979 and Farmington North, NM (1963) 1979 USGS 7.5' Series Quadrangles (1: 24,000 Scale)

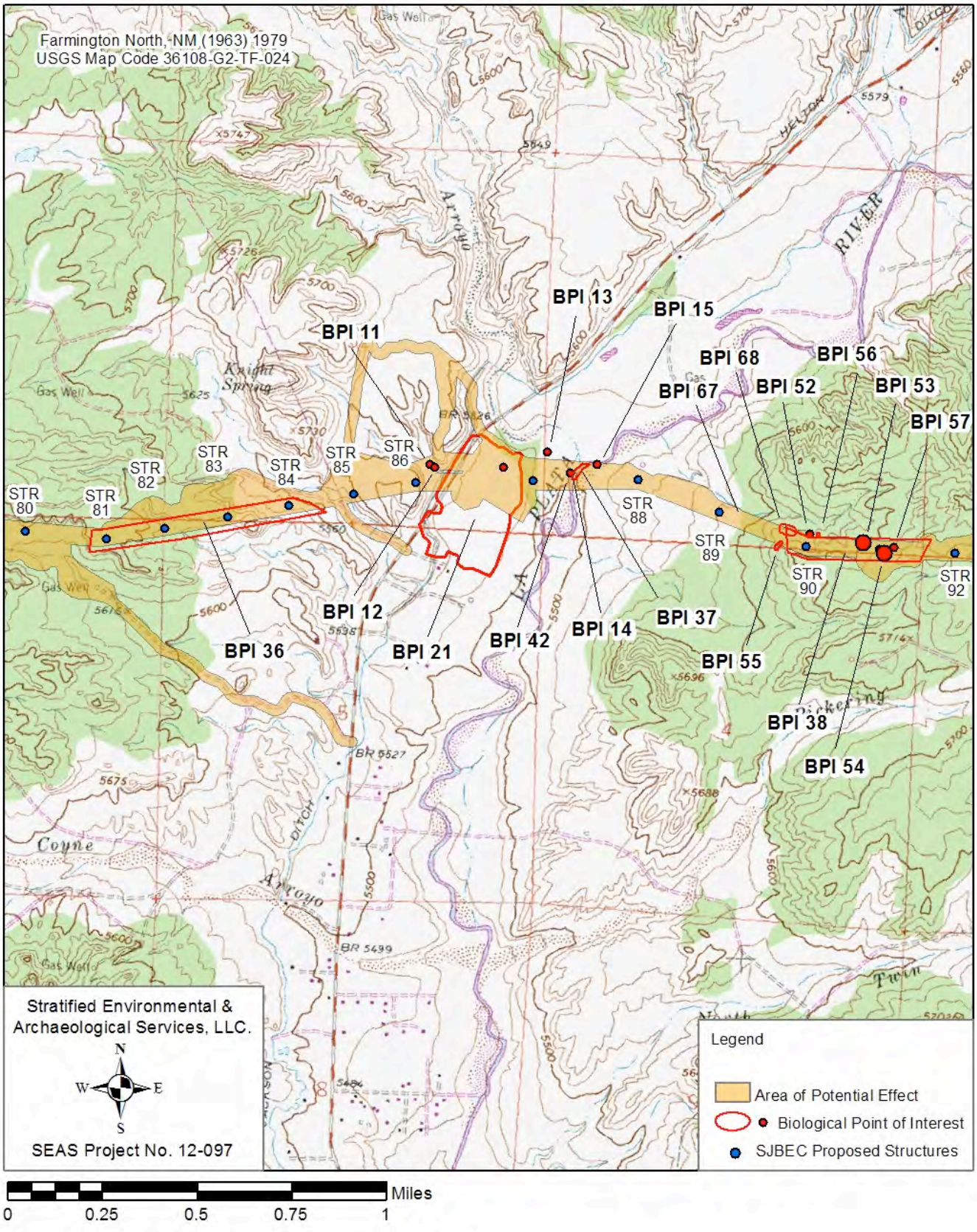

Figure 2.9 Project Location Map 8: Farmington North, NM (1963) 1979 USGS 7.5' Series Quadrangle (1: 24,000 Scale)

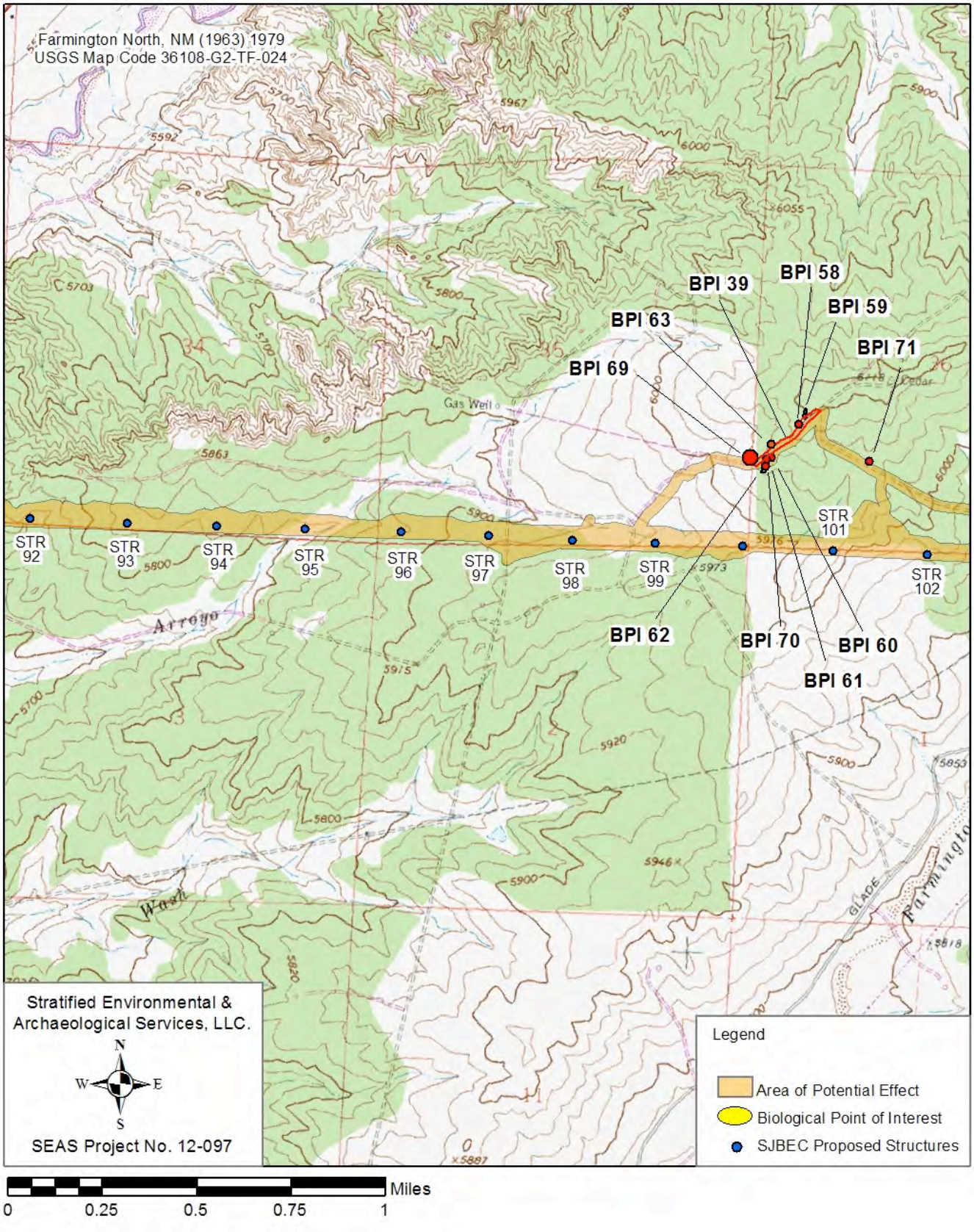

Figure 2.10 Project Location Map 9: Farmington North, NM (1963) 1979 USGS 7.5' Series Quadrangle (1: 24,000 Scale)

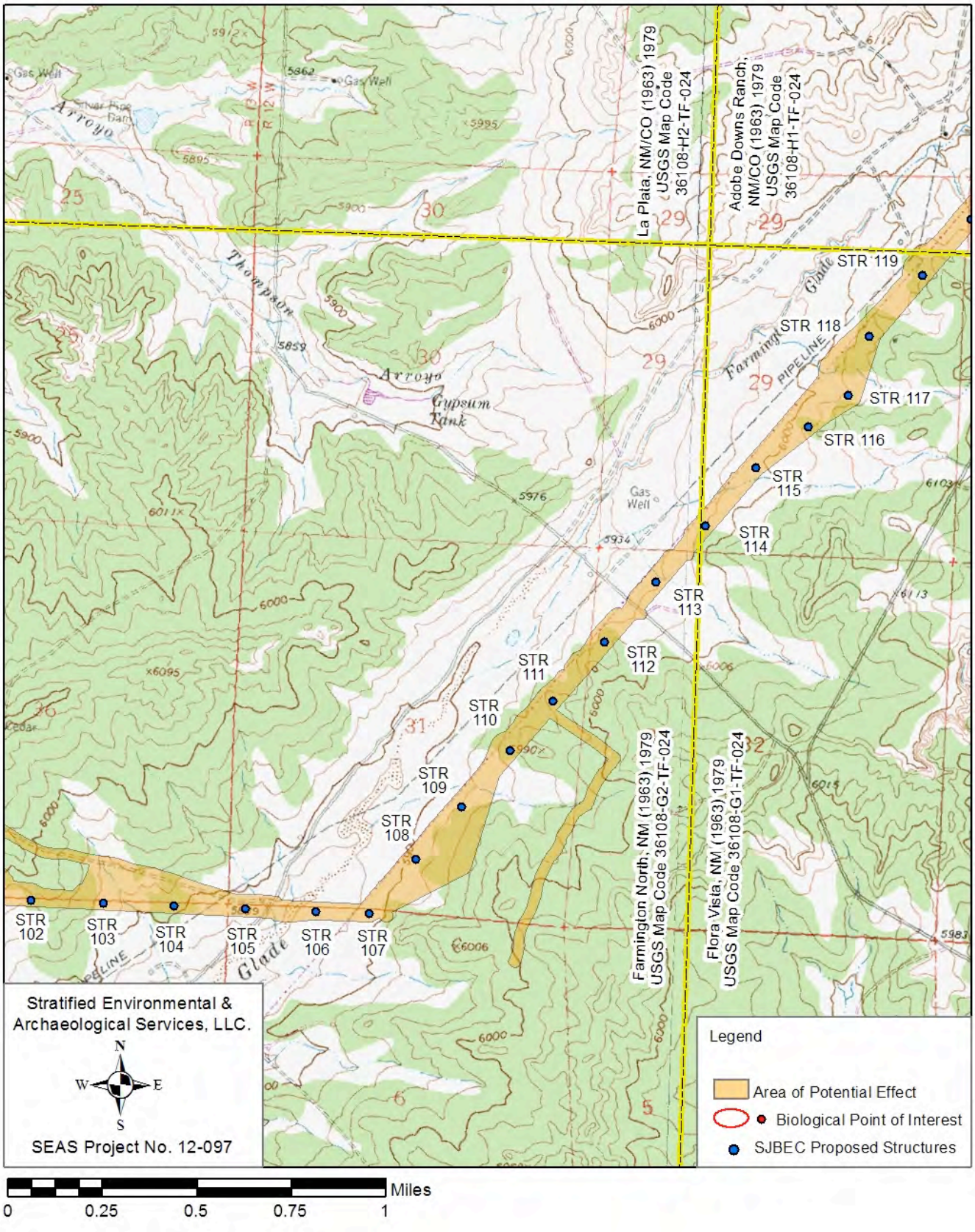

Figure 2.11 Project Location Map 10: Farmington North, NM (1963) 1979 and Flora Vista, NM (1963) 1979 USGS 7.5' Series Quadrangles (1: 24,000 Scale)

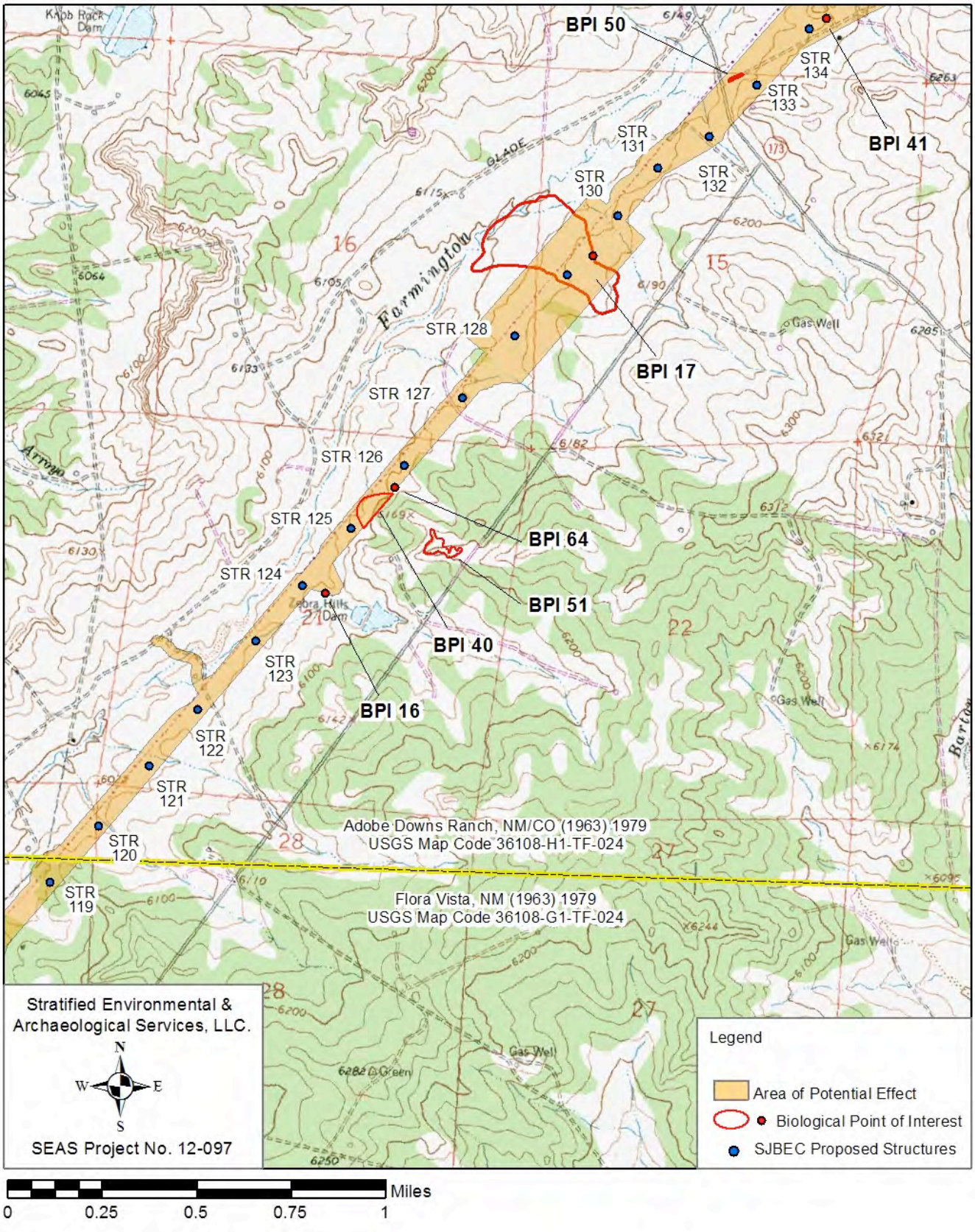

Figure 2.12 Project Location Map 11: Flora Vista, NM (1963) 1979 and Adobe Downs Ranch, NM (1963) 1979 USGS 7.5' Series Quadrangles (1: 24,000 Scale)

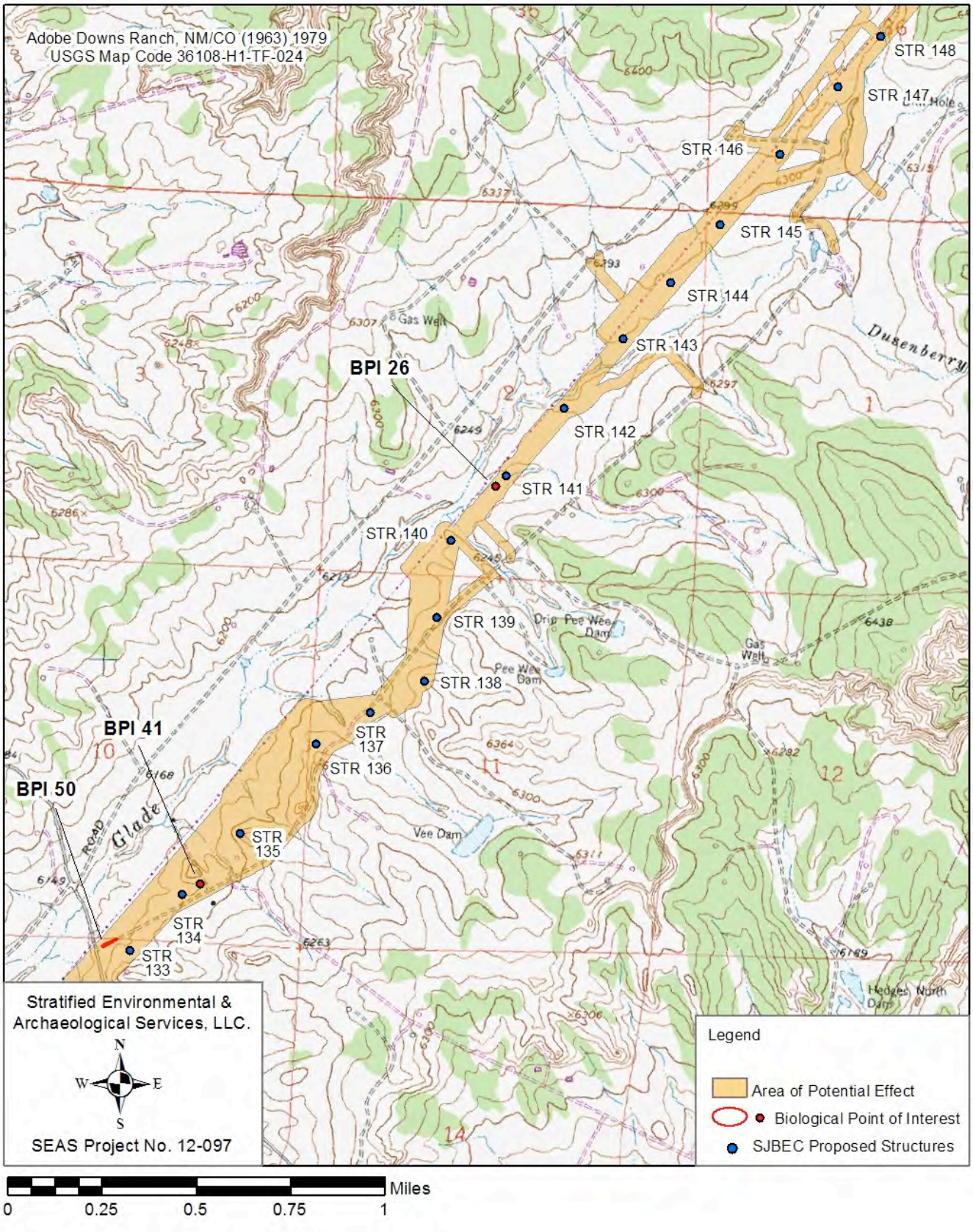

Figure 2.13 Project Location Map 12: Adobe Downs Ranch, NM (1963) 1979 USGS 7.5' Series Quadrangle (1: 24,000 Scale)

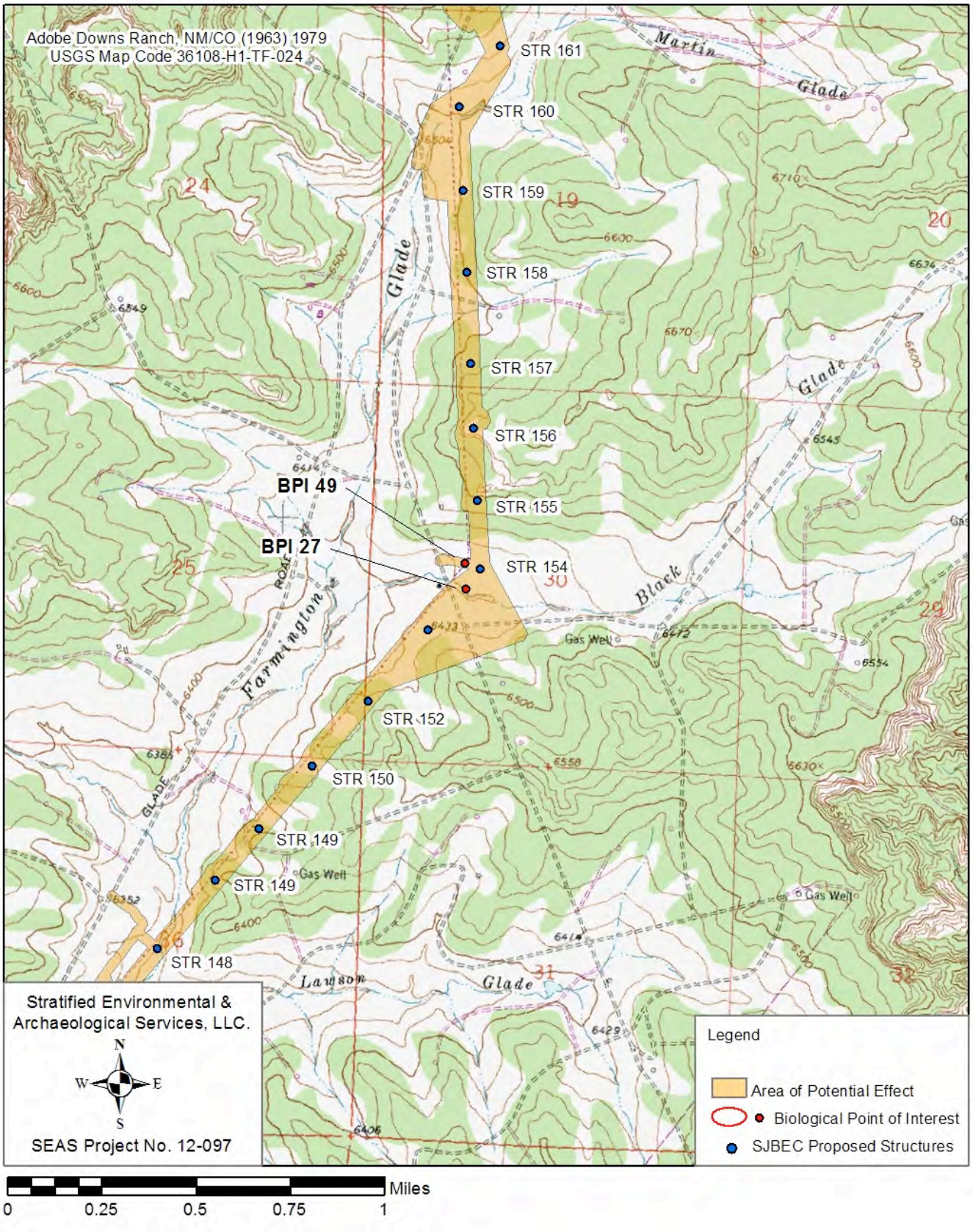

Figure 2.14 Project Location Map 13: Adobe Downs Ranch, NM (1963) 1979 USGS 7.5' Series Quadrangle (1: 24,000 Scale)

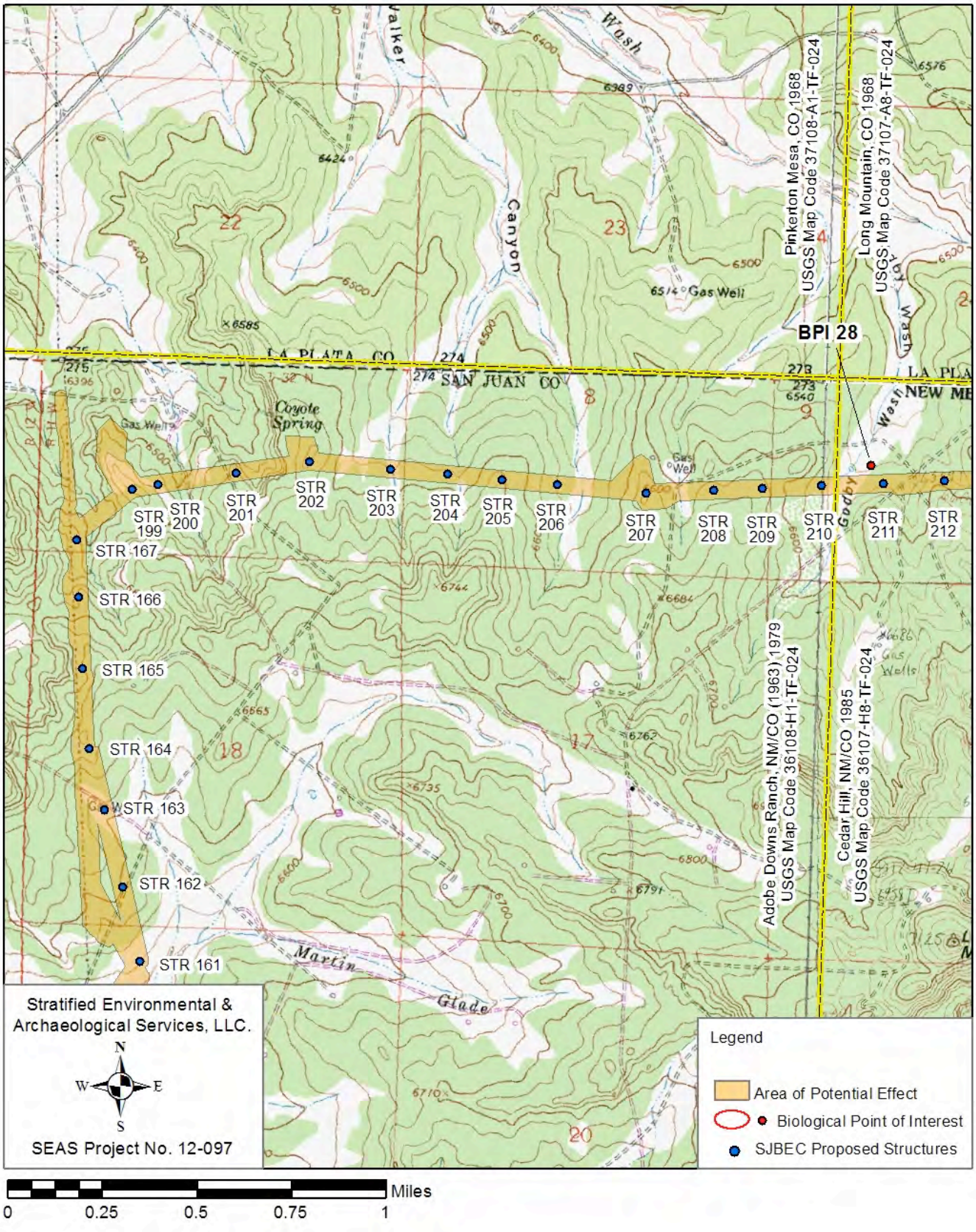

Figure 2.15 Project Location Map 14: Adobe Downs Ranch, NM (1963) 1979 USGS 7.5' Series Quadrangle (1: 24,000 Scale)

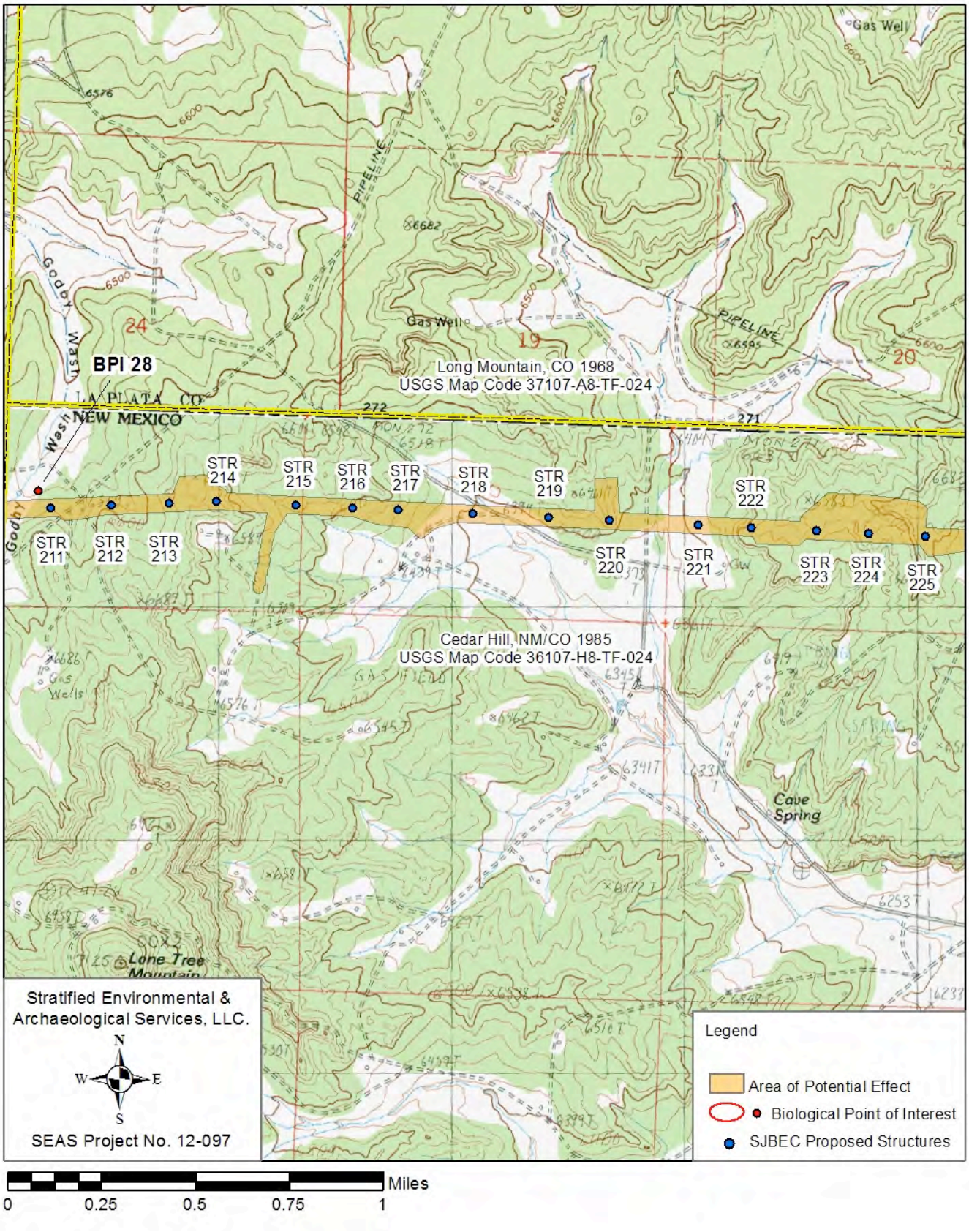

Figure 2.16 Project Location Map 15: Adobe Downs Ranch, NM (1963) 1979 and Cedar Hill, NM/CO 1985 USGS 7.5' Series Quadrangles (1: 24,000 Scale)

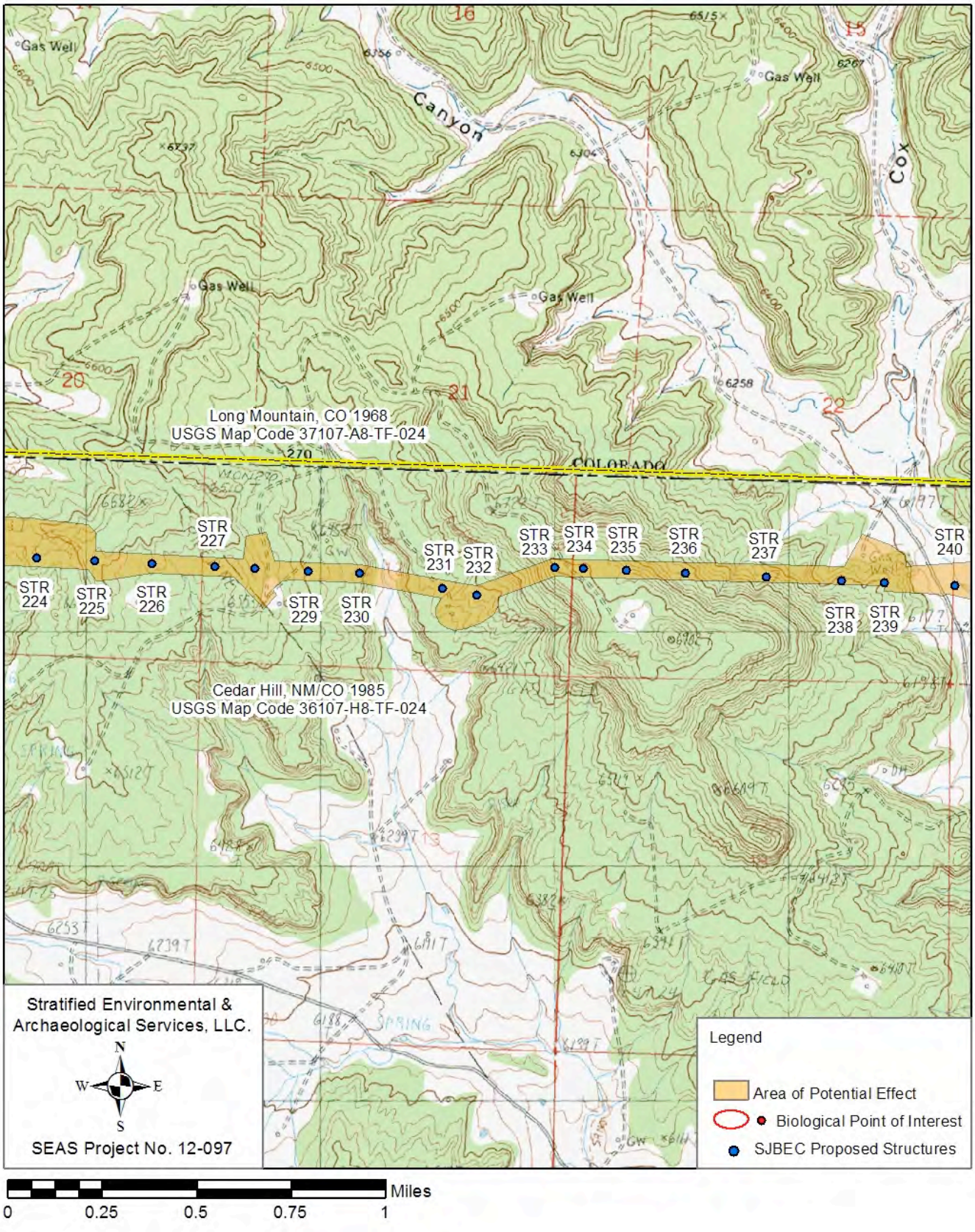

Figure 2.17 Project Location Map 16: Cedar Hill, NM/CO 1985 USGS 7.5' Series Quadrangle (1: 24,000 Scale)

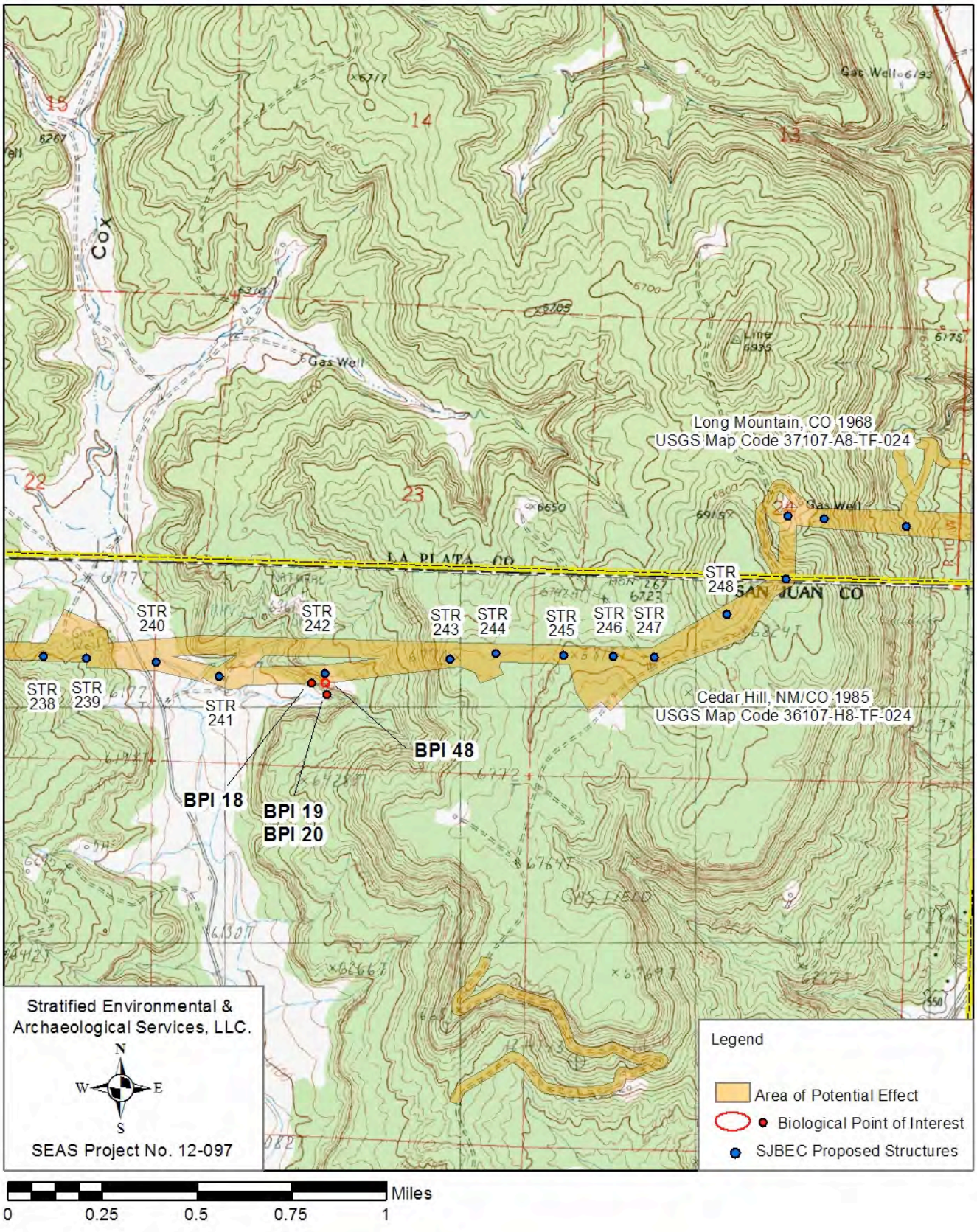

Figure 2.18 Project Location Map 17: Cedar Hill, NM 1985 and Long Mountain, CO 1968 USGS 7.5' Series Quadrangle (1: 24,000 Scale)

Figure 2.19 View North Towards Westwater Arroyo Valley South of Structure 17 (Top) and View West of Shumway Arroyo Valley Near Structure 42 (Bottom)

Figure 2.20 View West Across Shumway Arroyo Valley (Top) and View West From Piñon Mesa Near Structure 67 (Bottom)

Figure 2.21 View East Near Structure 92 Towards La Plata River Valley (Top) and View North Near Structure 125 Up the Farmington Glade (Bottom)

Figure 2.22 View East Near Structure 221 (Top) and View Northwest of Cox Canyon Crossing Near Structure 243 (Bottom)

The proposed transmission line would start at the proposed new Three Rivers Substation to be built near Western's existing Shiprock Substation in New Mexico. From the Three Rivers Substation, the new 230 kV transmission line would be built as a double-circuit line using metal lattice structure, though only one circuit would be built, and would follow an existing 345 kV transmission line north for approximately 4 miles and east for approximately 17 miles. In this section, the double-circuit transmission line would cross the La Plata River at a location parallel to the existing 345 kV transmission line. Approximately 4 miles east of the La Plata River crossing, the double-circuit transmission line would head northeast for approximately 13 miles, paralleling Western's 345 kV transmission line and the City of Farmington's 115 kV transmission line. It would continue through the BLM managed Glade Run Recreation Area to the proposed location for the Kiffen Canyon Substation.

From the Kiffen Canyon Substation, the double-circuit transmission line would continue northeast towards the Colorado-New Mexico state line, where the double-circuit configuration would change to a single-circuit configuration using two- or three-pole wood structures. Approximately 0.25 miles south of the state line, the proposed single-circuit transmission line would deviate from the 115 kV and 345 kV transmission lines and, to the greatest extent feasible, would follow existing oil and gas well access roads along the state line for approximately 9 miles until crossing into Colorado and entering SUIT lands. From this point, proposed single-circuit transmission line continues for another mile and cross US Highway 550 and the Animas River with one span, then extends north and east for 15 miles across SUIT lands in the Mesa Mountains. The line then crosses onto private lands for 2 miles and intersects with LPEA's recently constructed 115 kV Iron Horse transmission line. From this point, the proposed SJBEC transmission line would share structures with the existing line for approximately 4 miles and terminating at the existing Iron Horse Substation.

The SJBEC project will include construction of the new transmission line including temporary use areas for structure assembly areas, wire-pulling, tensioning and splicing sites, construction yards and staging areas, structure construction sites, guard structures, and fly yards. The project also includes new substation construction or expansion, and improvements to existing access roads or construction of new roads, which would consists of grading, cuts or fills, and installation of erosion-control features. Typical construction equipment would include soil boring trucks, D-6 bulldozers, road graders, dump trucks, digger derricks, concrete trucks, flatbed trucks with cranes, bobcats, pole trailers, bucket trucks, small bulldozers, boom trucks, reel trailers, wire-pulling trucks, tensioners, seeding equipment, and pickup trucks.

3.0 Methodology

The project area was surveyed by Mindy Paulek for faunal resources and Doug Loebig for floral resources between October 23 and November 29, 2012. In light of timing and other constraints, the project area was not subject to 100 percent pedestrian coverage and each biologist could only employ incremental pedestrian surveys coupled with vehicular assessments in an attempt to adequately characterize the nature and condition of biological resources. Despite the fall timing of the field investigations, the weather during the survey was consistently cool (AM) to warm (PM) and typically clear to partly cloudy with variable breezes and winds. It should be noted that the Four Corners region was subject to an extreme drought in 2012 and field conditions were not ideal for identifying certain species in the field. Furthermore, the late timing of the survey dictated that only habitat suitability could be assessed for certain rare species, rather than presence/absence. The biological survey investigations

were initiated by Tri-State to assess the current state and nature of biological resources within the project area and to make recommendations for further biological fieldwork, including during the growing season of 2013 for rare plants. Habitat types were documented and maps have been generated depicting the various habitat types/plant communities in the project area (see Section 4). From April 29 to May 16, 2013, SEAS biologists returned to the project to intensively survey rare plant habitats identified by the BLMFFO and during the SEAS 2012 fieldwork. Several additional areas were added to the project since the late fall of 2012 and these areas were also visited in the spring of 2013 for vegetation mapping and habitat assessment. Rare plants identified during the 2013 survey were documented with GPS equipment, photography, and descriptions of the abiotic and biotic setting at each locale. BLMFFO requested that species-specific surveys for ESA listed and BLM Special Management Species with potential to occur in the project (Mesa Verde cactus [*Sclerocactus mesae-verdae*], Brack hardwall cactus [*Sclerocactus cloveriae* Heil & Porter var. *brackii*], and Aztec gilia [*Aliciella formosa*]) be performed in April and May when the plants are most detectable. Species-specific surveys for rare plants lacking regulatory status were not required by the BLMFFO, although they requested that locations of the unprotected rare plant species incidentally encountered during survey of the formally protected species be reported. Additional biological fieldwork for wildlife species, such as nesting raptor surveys, will be conducted in the year just prior to construction.

The field investigations resulted in the identification of biological points of interest (BPIs) within and adjacent to the project area that may be of a sensitive nature. BPIs identified during the investigations included noxious weed infestations, rare plant and animal habitats, verified rare species locations, prairie dog complexes, wetlands, vacant or active mammal dens, and areas with Migratory Bird Treaty Act (MBTA) concerns, such as nest sites and high quality nesting habitat (e.g., riparian woodland forest/woodland and protected cliff faces). The project area, plant communities, and notable biological resources (BPIs) were mapped with GPS equipment. Specifically, data were collected with sub-meter accurate Trimble Geo XH and XT units. The documented biological resources are divided into four categories and discussed in more detail below:

- Threatened, Endangered, and Species of Special Concern Habitat
- Surface Waters and Wetlands
- Vegetation Communities and Noxious Weeds
- Wildlife

3.1 Threatened and Endangered Species

Prior to the biological field surveys, a list of protected and sensitive species which may occur in San Juan County was compiled from the USFWS (USFWS 2012), Biota Information System of New Mexico (BISONM) (BISONM 2012), and New Mexico Rare Plant Technical Council (NMRPTC) (NMRPTC 2012) websites and the BLMFFO Resource Management Plan (BLMFFO 2003), including periodic updates for BLMFFO Special Management Species (SMS). Habitat types and their suitability for rare species with potential to occur in San Juan County were reviewed prior to fieldwork, as was data of known raptor nesting sites provided by the BLMFFO. Habitat suitability for rare species was assessed by pedestrian surveys conducted in regular intervals throughout the proposed easement. More intensive pedestrian rare plant surveys were conducted by SEAS in April and May of 2013 during the optimal period of detection for the species BLMFFO determined required further evaluation; (Mesa Verde cactus, Brack hardwall cactus, and Aztec gilia). Rare plant surveys were conducted by parallel pedestrian transects with field biologists spaced no more than 5 m apart to ensure 100 percent coverage of the project

area and 50-foot buffers in identified suitable habitat. When rare plants were found, each was pinflagged and individuals or concentrations were documented with GPS equipment, field forms, and photographs. Additional biological fieldwork for rare wildlife species, such as the ESA listed black-footed ferret (*Mustela nigripes*), will be conducted in the year just prior to construction.

3.2 Surface Waters and Wetlands

Potential jurisdictional wetlands, as defined by the U.S. Army Corps of Engineers (USACE) (USACE 1987) and in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manuel: Arid West Region* (USACE 2006), occur only at the La Plata River Crossing of the SJBEC Project. However, the fringe wetland is restricted to a thin zone on the lower river banks. The hydrophytic vegetation and associated riparian habitats of the floodplain zone will not be disturbed by the proposed action, as the area will be spanned, with no pole placements in the bottomlands. Excluding periodic flows of the numerous intermittent drainages and washes following major precipitation events and spring runoff, perennial surface water does not occur within the project. This includes the La Plata River at the SJBEC crossing, which was completely dry during the 2012 field investigation.

3.3 Vegetation Resources and Noxious Weeds

Various botanical keys were consulted for species identifications, including *A Flora of New Mexico* (Martin and Hutchins 1981), *Arizona Flora* (Kearney and Peebles 1960), *A Utah Flora* (Welsh et al. 1993), *Weeds of the West* (Whitson et al. 1999), *Colorado Flora: Western Slope* (Weber 1987), and *The Manual of the Plants of Colorado* (Harrington 1954). *Western Wetland Flora* (USGS 2006), *Field Guide to Intermountain Rushes* (USFS 1997), *Field Guide to Intermountain Sedges* (USFS 1998), *A Field Guide to the Grasses of New Mexico* (Allred 2005), and *The Manual of the Grasses of the United States* (Hitchcock 1971). A list of all identified plant species observed during the biological field studies is provided in Section 4 (Table 4.3), as are plant community descriptions. The timing of the 2012 survey was not conducive to herbaceous species identifications and while many were recognized based on forensic evidence, numerous plant species in each habitat type were not identified as the plant material was too badly deteriorated. Therefore, the plant community descriptions are based primarily on woody species and soil types, acknowledging that herbaceous species may be under represented. Plant species incidentally identified during the 2013 rare plant survey were added to the flora table and community descriptions.

3.4 Wildlife Resources

Various field guides were consulted for species identification and evaluation of suitable habitat, including *National Audubon Society, Field Guide to Mammals* (Whitaker 1996) and *Mammals of Colorado* (Fitzgerald 1994). Bird species identifications were verified visually with binoculars (10 x 42) using the *Stokes Field Guide to Birds: Western Region* (Stokes and Stokes 1996), *A Field Guide to Western Birds* (Peterson 1990), *The Guide to Colorado Birds* (Gray 1998), or *The Sibley Guide to Birds* (Sibley 2000). Bird vocalization identifications are based on the National Audubon Society's (1996) *Interactive CD-ROM Guide to North American Birds*. Lists of animal species observed or inferred from evidence (e.g., tracks, species, scrapes, or vocalizations) at the project site in 2012 were compiled. SEAS biologists added numerous species to the fauna list that were incidentally encountered during the 2013 rare plant surveys. Reptiles were absent during the 2012 field survey due to the late fall timing, although several species were identified during the 2013 spring rare plant surveys. All burrows and nests were examined carefully for signs of recent occupation. Potential raptor habitat, such as ledges, cliffs, or large trees

within one-third mile of project areas were scanned with high-powered optics for evidence of roosts and nests, when feasible. Encounters with sensitive species, including non-endangered raptors, were noted. All Gunnison's prarie dog (*Cynomys gunnisoni*) colonies and complexes were mapped with GPS equipment within the project area given the affinity of rare species for such habitats, such as the Western burrowing owl (*Athene cunicularia hypugea*), mountain plover (*Charadrius montanus*), and black-footed ferret (*Mustela nigripes*). In addition, BLM prairie dog and raptor nesting site data were reviewed prior to fieldwork.

4.0 Environmental Setting

Elevation in the project area ranges from 5,280 ft (1,609 meters [m]) at the Shiprock Substation to 6,880 ft (2,097 m) above mean sea level (amsl) at the New Mexico/Colorado state line just west of the Animas River valley. The project area in New Mexico begins east of the Hogback and north of Waterflow in gently rolling desert terrain. It continues north of the San Juan Generating Station and the San Juan Coal Mine, heading east across the broad valley of The Meadows before ascending Pinon Mesa and crossing the valley of the La Plata River. The project continues northeast from the La Plata River valley across the rolling hills, sandy arroyos, and sandstone slickrock between the river valley and the Farmington Glade. At the northern extent of the Farmington Glade the transmission line turns east, paralleling the New Mexico/Colorado state line. Continuing east, it traverses the steep slopes of the entrenched canyons and ridges west of the Animas River valley, before crossing into Colorado. The SJBEC Project occurs within an anthropogenic desert landscape of mesas, canyons, and alluvial plains. A variety of grasslands, scrublands, shrublands, and woodlands inhabit the region.

Intensive and extensive energy development occurs throughout the region and consists of an existing network of natural gas and oil well pads, pipelines, water lines, roads, compressors, power lines, coal mines, reclaimed and historic mines, and the San Juan Generation Station. From Structure 2 to Structure 167, the SJBEC Project parallels an existing corridor with two major transmission lines and associated access roads and substations. Other developments in the area include agricultural lands in the La Plata River Valley, grazing management features (e.g., ponds, two-track roads, and fences), and a widespread system of dirt roads, gravel roads, paved roads, and highways.

Historical climate records from Shiprock (Station 298284), for the period 1926 to 2005, are provided below in Table 4.1 (WRCC 2012). Average annual maximum temperature at the Shiprock station is 69.8° Fahrenheit (F) and average annual minimum temperature is 36.4° F for the same period. Average annual total precipitation is 7.00 inches and average total snowfall is 4.2 inches. April and June are the driest months of the year, ranging from 0.41 inches in April to 0.29 inches in June. August, September, and October are the wettest months of the year, ranging from 1.00 inch in August to 0.78 inches in October (WRCC 2012). The frost-free growing season lasts from 135 to 150 days (NRCS 2012). Throughout the Northern Southwest, the marked increase in precipitation during late summer is caused by a monsoonal circulation pattern. This pattern originates when the hemisphere warms up in summer and shifts the westerlies and sub-polar lows northward. This pushes a high-pressure cell (the Bermuda High) over the central United States. The western edge of the Bermuda High rotates clockwise sending moisture laden air into the Southwest from the south. The convective air currents created by the hot lowland deserts and the convergence of the moist air masses with the cooler highland air often creates powerful afternoon thunderstorms from mid to late summer (Sellers and Hill 1974; Gillispie 1985: 14-15).

The San Juan Dome and the San Juan Basin were initially formed by tectonic shifts, episodic uplifts, and related volcanism that occurred during Late Cretaceous times, known as the Laramide Orogeny which began 70 to 80 million years ago and ended 35 to 55 million years ago during the Upper Cretaceous. The surface geology within the project includes late Upper Cretaceous rocks deposited near a series of transgressions and regressions of a vast inland sea. The sea was situated east of the Colorado Plateau preceding the Laramide Orogeny, with increasing sea levels (transgression) moving northwest through the Four Corners and decreasing shorelines (regressions) heading southeast (Aubrey et al. 1991).

Table 4.1 Weather Data at the Shiprock, New Mexico Climate Station from 1926 to 2007 (Station 298284)

Average	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Maximum Temp. (F°)	43.00	50.60	59.90	70.00	79.80	90.10	94.6	91.90	85.10	72.40	56.20	44.10	69.80
Minimum Temp. (F°)	15.70	21.50	27.50	34.90	43.8	51.20	58.8	57.30	48.00	36.00	25.10	16.90	36.40
Total Precip. (in)	0.46	0.46	0.54	0.41	0.51	0.29	0.66	1.00	0.80	0.78	0.52	0.57	7.00
Total Snowfall (in)	1.60	0.70	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	1.00	4.20

The project passes through several geologic formations (Hunt 1978), including the San Jose Formation and Nacimiento Formation on the east side of the project to just east of the La Plata River. The San Jose Formation is only exposed on the high mesas at the far east side of the project, transitioning to a more gentle landscape of Nacimiento Formation sandstones and shales to just east of the La Plata River Valley. The Ojo Alamo Sandstone is present on the lower ridge slopes east of the La Plata River Valley, where it interfingers with similar shale members of the Nacimiento Formation. The upper portion of Piñon Mesa, just west of the La Plata River, is capped by the Ojo Alamo Sandstone, with Kirkland Shale and the Fruitland Formation forming slopes, benches, and plains to the west. Exposures of Kirkland Shale and the Fruitland Formation occur throughout the remainder of the project west to the Shiprock Substation.

The Nacimiento Formation is of Paleocene age and consists of gray, green, brown, and red shale and mudstones, less resistant and typically more slope forming than the San Jose Formation. The Nacimiento Formation is derived from low-gradient stream and lake deposits (Aubrey et al. 1991: B18-B21). The San Jose Formation is of Eocene age and comprised of various sandstone, sandy shale, conglomerate, and tuff members derived from low gradient stream and lake deposits similar to the Nacimiento Formation. The formation has a higher content of sand on the north side, suggesting a northern source area (San Juan Dome) for the fluvial deposits. The Ojo Alamo Sandstone, like the Nacimiento, is also Paleocene in age and overlies the Kirkland Shale, where it generally outcrops given its more resistant character. The depositional environment consisted of sandy braided streams on a broad alluvial plain. Conglomeritic pebble and cobble lenses occur and decrease in size from north to south, with the depositional energy derived from uplifts of the San Juan Dome (Aubrey et al. 1991: B16).

The Fruitland Formation and the Kirkland Shale on the west side of the project are both of Upper Cretaceous origin. The Fruitland Formation is comprised of various sandstone, siltstone, shale, carboniferous shale, and coal members representing deposits from coastal swamp, coastal plain, alluvial, and lacustrine environments. The sediments were deposited inland from the contemporaneous Pictured Cliffs Formation, which represent a series of prograding and aggrading shoreline deposits of the vast inland sea of Cretaceous times. The Kirkland Shale rests conformably on the Fruitland Formation and is thickest to the northwest and thins out to the southeast. The Kirkland Shale is a series of sandstone and shale beds representing terrestrial alluvial deposits, with the many interfingered shale, siltstone, and mudstone lenses representing overbank deposits. The sandstone members probably represent channel deposits from a meandering stream environment with numerous oxbows. The lack of coal in the Kirkland suggests few swamps and better drainage than the Fruitland deposition (Aubrey et al. 1991: B14-B16).

Soils in the project area are ultimately derived from sandstone and shale parent materials of the underlying and exposed geologic formations discussed above. Much of the area, from the Farmington Glade to the west, includes barren shale uplands, dissected by numerous intermittent drainages and deep

Table 4.2 Soil Types Within the Project Area

Soil Classification	Parent Material/ Landform	Approximate Structure Spans
Atrac-Florita-Travessilla association, hilly	Alluvium and residuum derived from sandstone and shale/ hills, fans, mesas, and breaks	174-214
Badland	Nonstony barren shale uplands that are dissected by deep intermittent drainageways and gullies	Access; 80-83
Badland-Monierco-Rock outcrop complex, moderately steep	Alluvial and eolian material derived from shale/ hills, ridges and mesas	Access; 1-4; 6-19; 21-25; 36-41; 46-53
Material derived from shale/ hills, ridges and breaks	Material derived from shale/ hills, ridges and breaks	Access; 62-72; 83-87; 89
Beebe loamy sand	Alluvium derived from mixed sources/ flood plains and low river terraces	96-97
Blancot-Fruitland association, gently sloping	Alluvium derived dominantly from sandstone and shale/ fans and in valleys	240-241
Blancot-Notal association, gently sloping	Alluvium derived dominantly from sandstone and shale/ fans and in upland valleys and Notal silty clay loam is on fans and valley bottoms	Access; 4-6; 19-21; 25-36; 41-46; 53-62; 73-80; 97-99; 128-160; 161-174
Buckle silt loam, gently sloping	Alluvium derived from sandstone/upland valleys	177-194; 203-204; 207-208; 218-220; 221-222
Doak loam, 1 to 3 percent slopes	Alluvium derived dominantly from sandstone and shale/ mesas, plateaus, and terraces	Access
Farb-Persayo-Rock outcrop complex, moderately steep	Residuum derived dominantly from sandstone/ hills and breaks	72-73; 89-91; 99-106; 107-110; 111-128
Gypsiorthids-Badland-Stumble complex, moderately steep	Material derived dominantly from gypsum	Access
Haplargids-Blackston-Torriorthents complex, very steep	Alluvium derived from mixed sources/ terraces, mesas, and plateaus	91-95; 133-152; 160-161
Rock Outcrop-Travessilla-Weska complex, extremely steep	Residuum derived dominantly from shale/ hills, breaks, and mesas	214-218; 220-221; 222-223; 231-240; 241-243
Stumble loamy sand, 0 to 3 percent slopes	Alluvium derived dominantly from sandstone and shale	Access

Table 4.2 Soil Types Within the Project Area (Continued)

Stumble sandy clay loam, gently sloping	Alluvium derived from sandstone and shale/ fans and valley sides	95-96
Stumble-Fruitland association, gently sloping	Alluvium derived dominantly from sandstone	87-89; 106-107; 110-111; 112; 116-128
Stumble-slickspots complex, gently sloping	Alluvium derived dominantly from sandstone and shale/ valley sides and fans	95-96
Travessilla-Weska-Rock outcrop complex, moderately steep	Travessilla is residuum derived dominantly from sandstone; Weska is residuum derived dominantly from shale/ upland hills, breaks, and mesas	223-231; 244-245
Turley clay loam, 1 to 3 percent slopes	Alluvium derived dominantly from sandstone and shale/ valley sides and fans	Access Road; 95-96
Turley clay loam, wet, 0 to 2 percent slopes	Alluvium derived dominantly from sandstone and shale/ fans	Access Road
Turley-Slickspots complex, 0 to 3 percent slopes	Alluvium derived dominantly from sandstone and shale/ fans	Access Road
Twick-Silver association, moderately sloping	Alluvium and residuum derived dominantly from shale/ hills	245-249
Walrees loam	Alluvium derived from mixed sources/ flood plains and terraces	96-97

arroyos. In the western and central portion of the project, alluvial fan deposits dominate the lower elevations with outcrop complexes and residual/colluvial deposits forming uplands and slopes. As the project area progresses north and east across the mesas and steep canyon slopes, residuum derived from sandstone and shale becomes more dominant along hills, breaks, and mesas with alluvial deposits occupying slope bases and valley bottoms. Soil classifications and associated parent materials are provided in Table 4.2 (NRCS 2012), with approximate pole spans for each soil type.

4.1 Flora and Plant Communities

Eight general plant community types were defined within the project area, including Great Basin desert scrubland (GBDS 1-2), salt desert scrubland (SDS 1-2), desert shrubland (DSHB 1), desert grassland (DG 1), piñon pine-juniper conifer woodland (PJ 1-7), wetland fringe (WF 1), riparian shrubland (RS 1), and riparian woodland (RW 1-2) (Figures 4.1 to 4.24). With the exception of wildfire, vegetation types in the region are largely driven by abiotic factors that influence the soil moisture regime, such as parent material, soil type, soil depth, water retention capacity, elevation, slope, orographic factors, and aspect. These factors influence one another in complex ways but tend to sort species along moisture and soil texture gradients. In the absence of agriculture or development disturbances, deep alluvial soils typically support Great Basin desert scrubland and at lower elevations, eventually give way to desert grassland and desert shrubland habitats. Mixed conifer woodlands usually occur on the shallower and coarser soil types

Figure 4.1 Plant Community Map Master Key

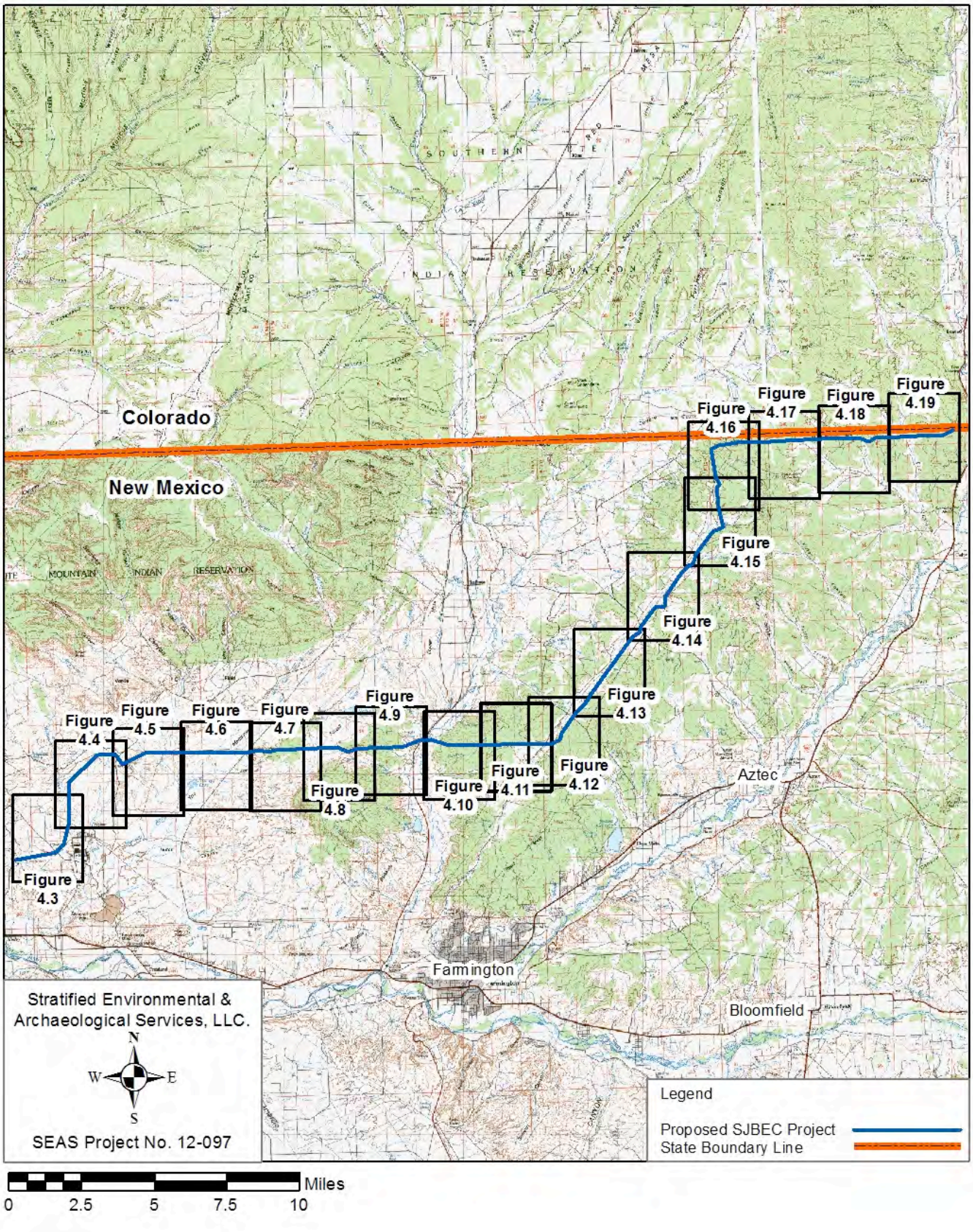

Figure 4.2 Plant Community Index Map

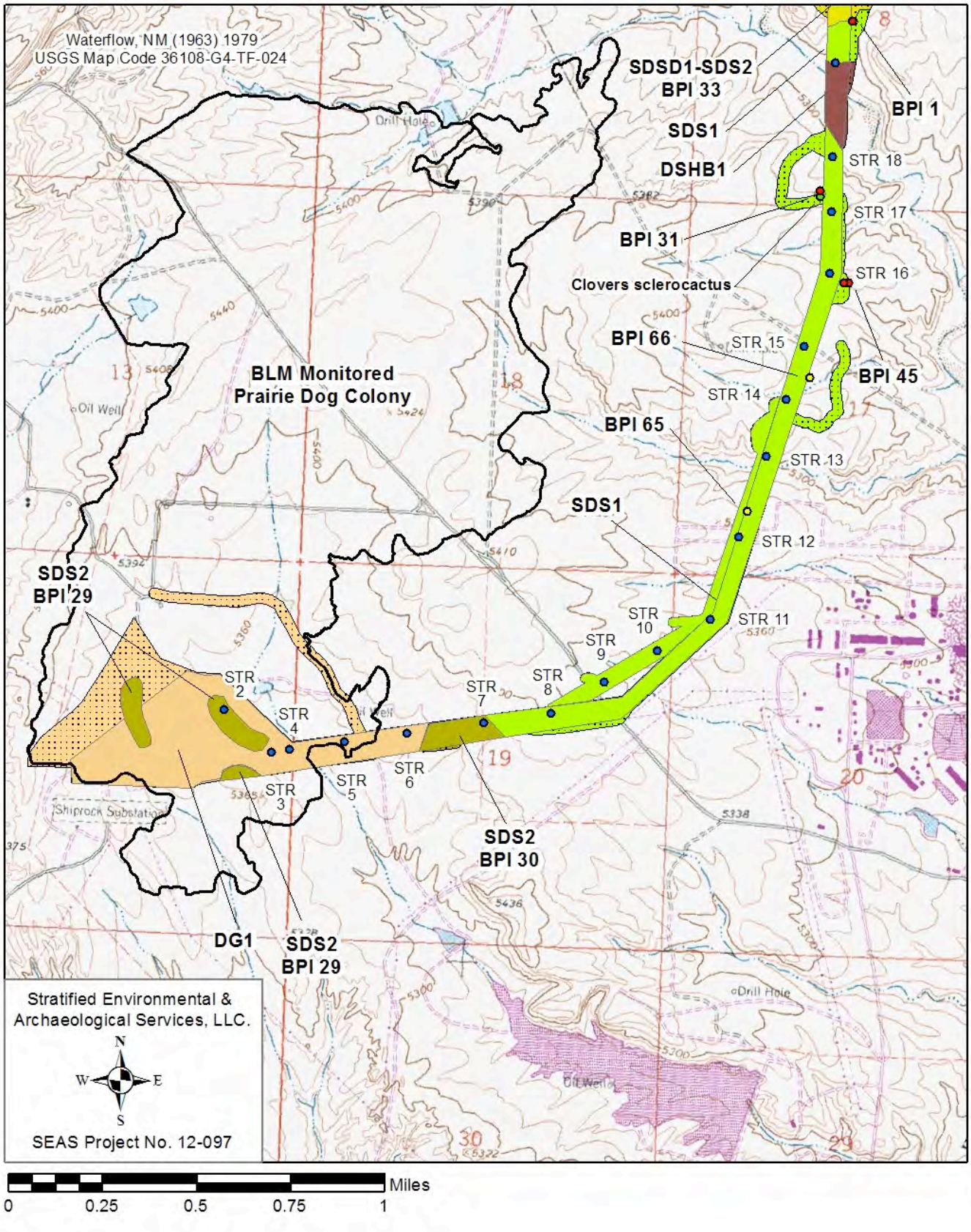

Figure 4.3 Plant Community Map 1: Waterflow, NM (1963) 1979 USGS 7.5' Series Quadrangles (1: 24,000 Scale)

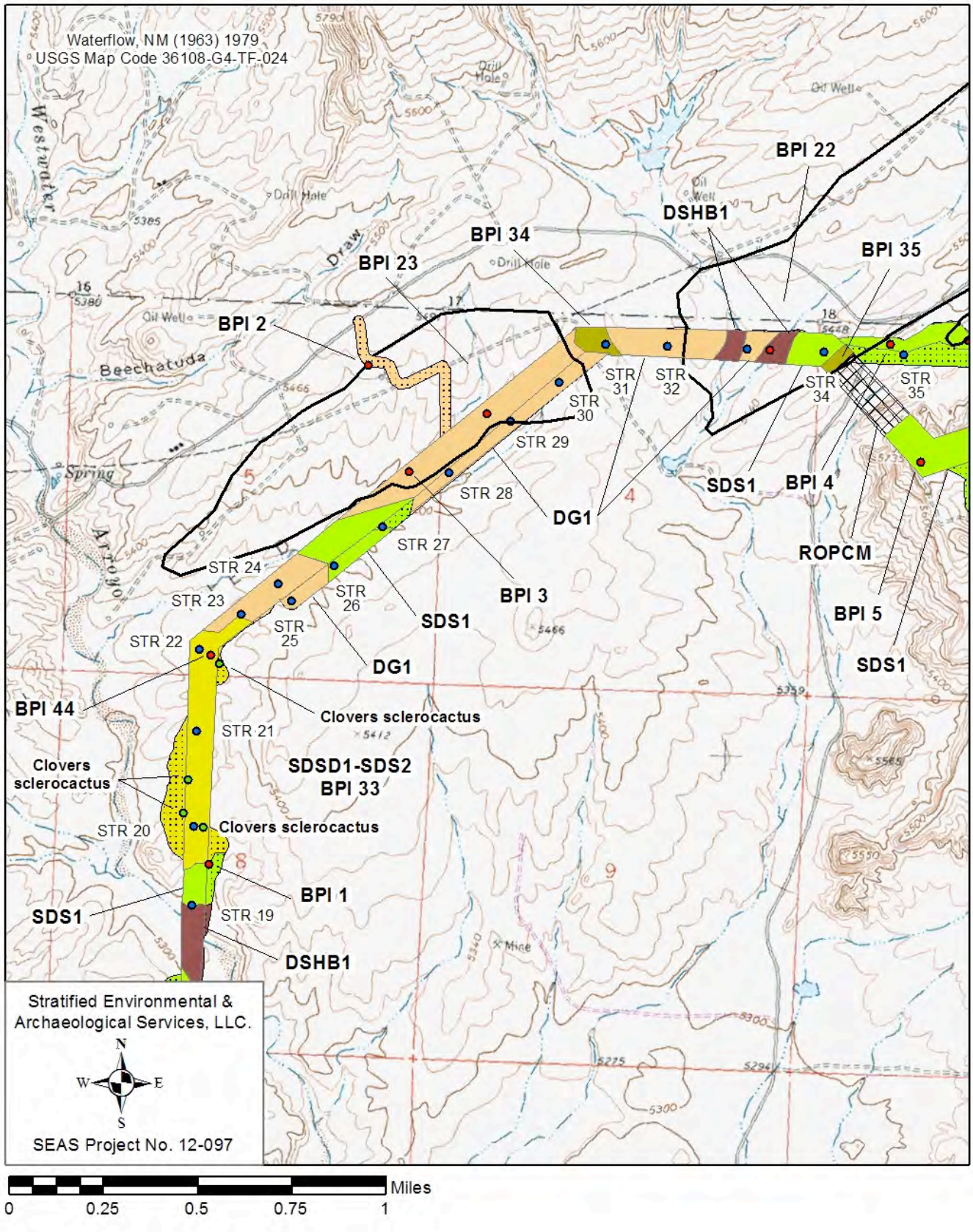

Figure 4.4 Plant Community Map 2: Waterflow, NM (1963) 1979 USGS 7.5' Series Quadrangle (1: 24,000 Scale)

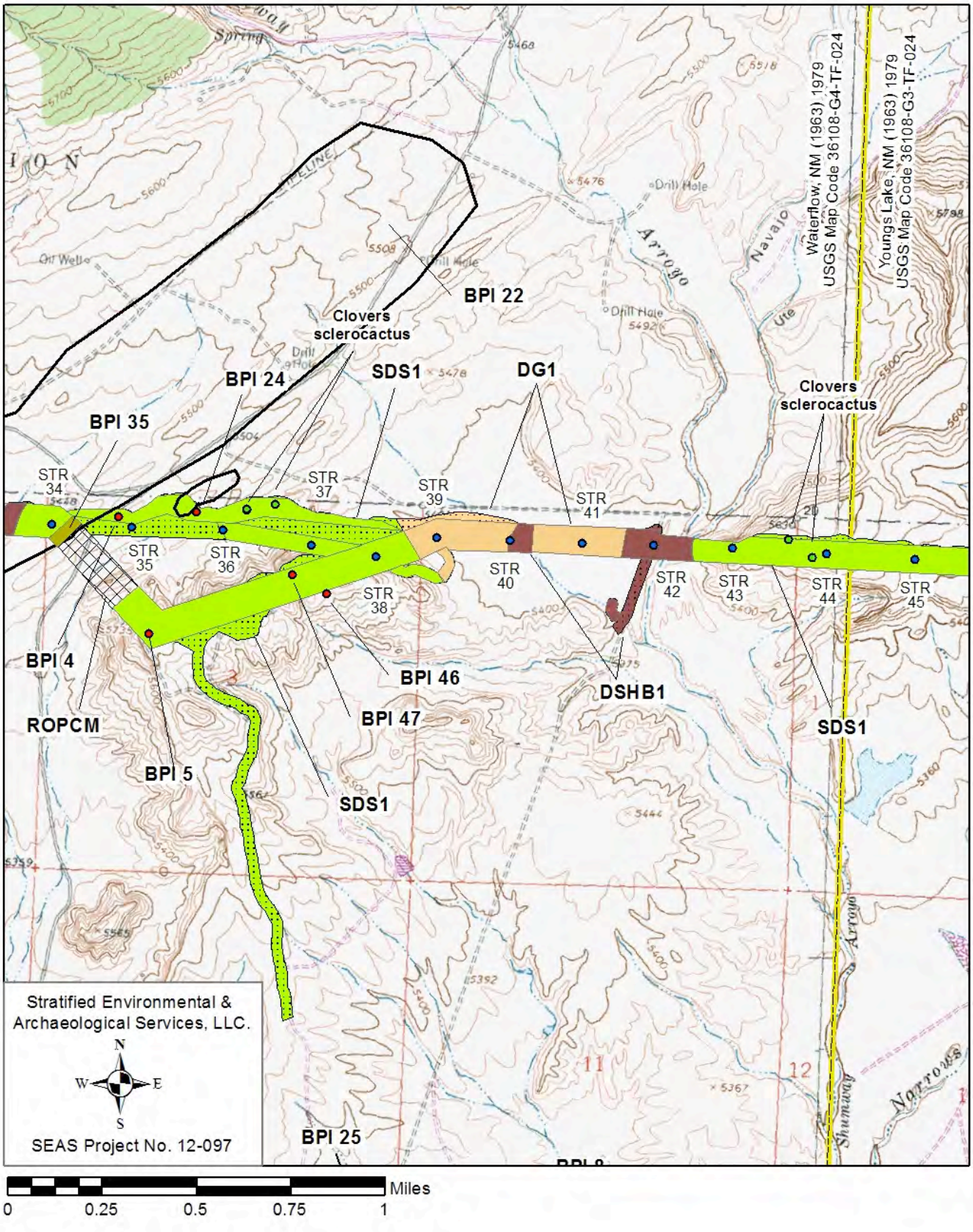

Figure 4.5 Plant Community Map 3: Waterflow, NM (1963) 1979 and Youngs Lake, NM (1963) 1978 USGS 7.5' Series Quadrangles (1: 24,000 Scale)

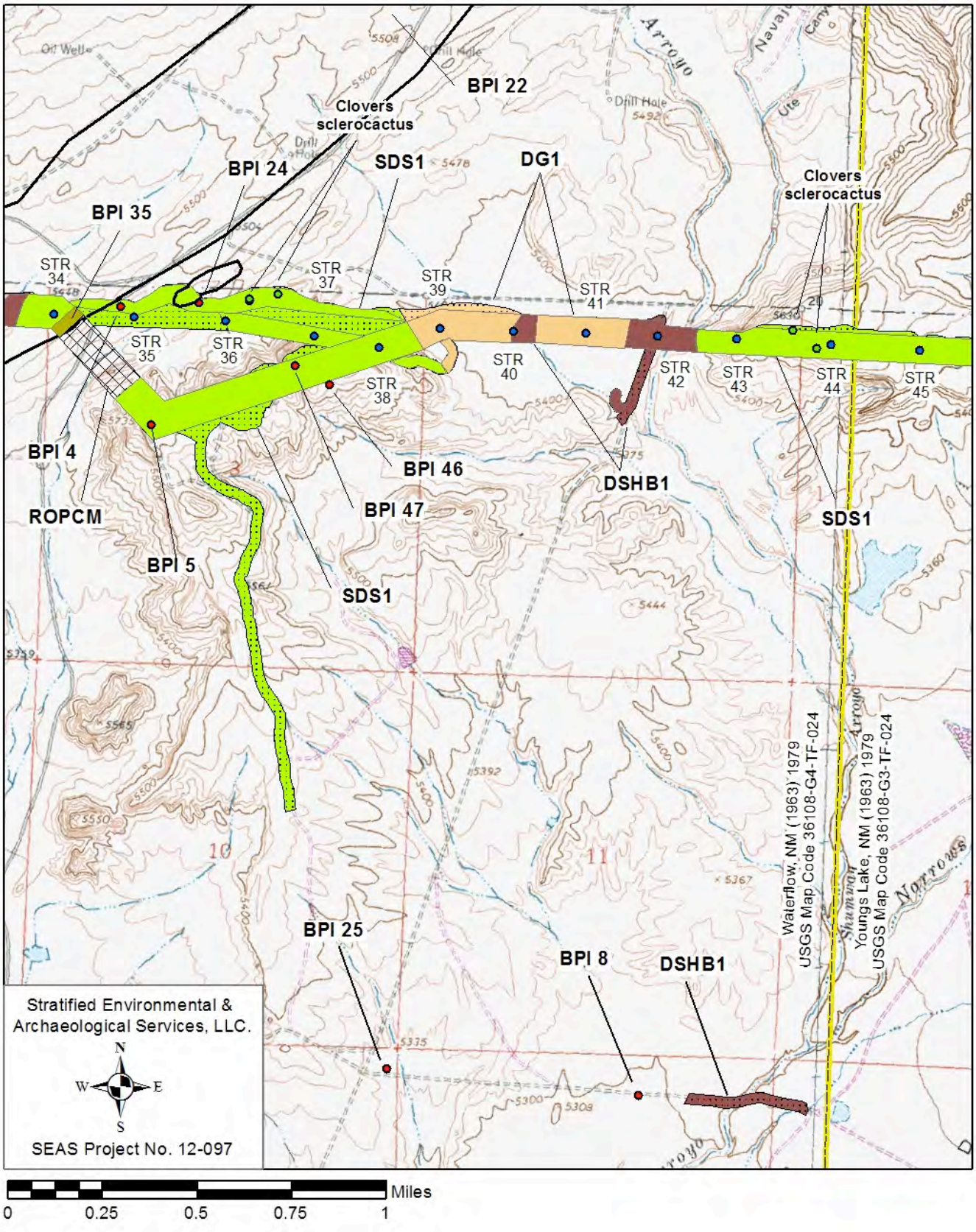

Figure 4.6 Plant Community Map 4: Youngs Lake, NM (1963) 1979 USGS 7.5' Series Quadrangle (1: 24,000 Scale)

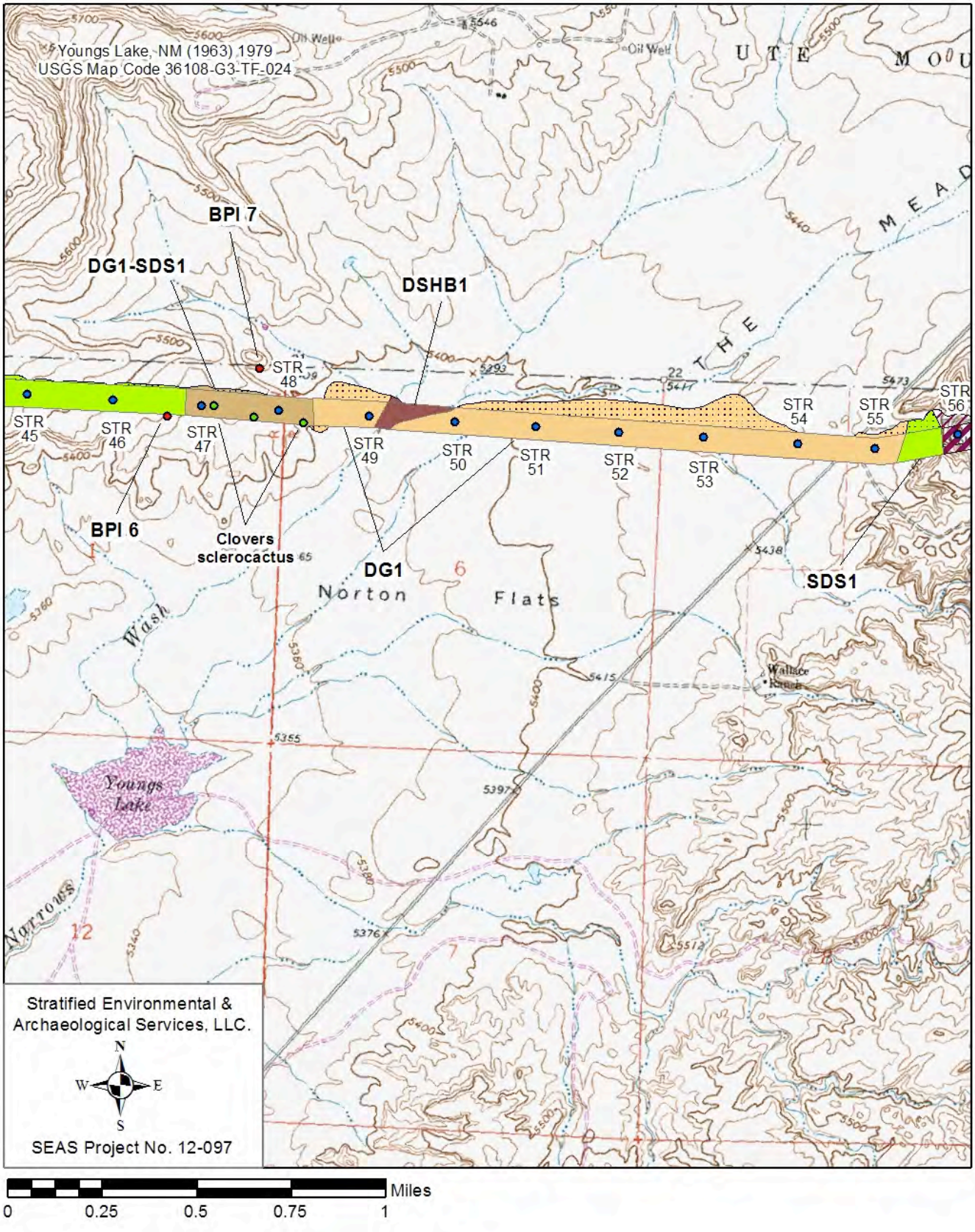

Figure 4.7 Plant Community Map 5: Youngs Lake, NM (1963) 1979 USGS 7.5' Series Quadrangle (1: 24,000 Scale)

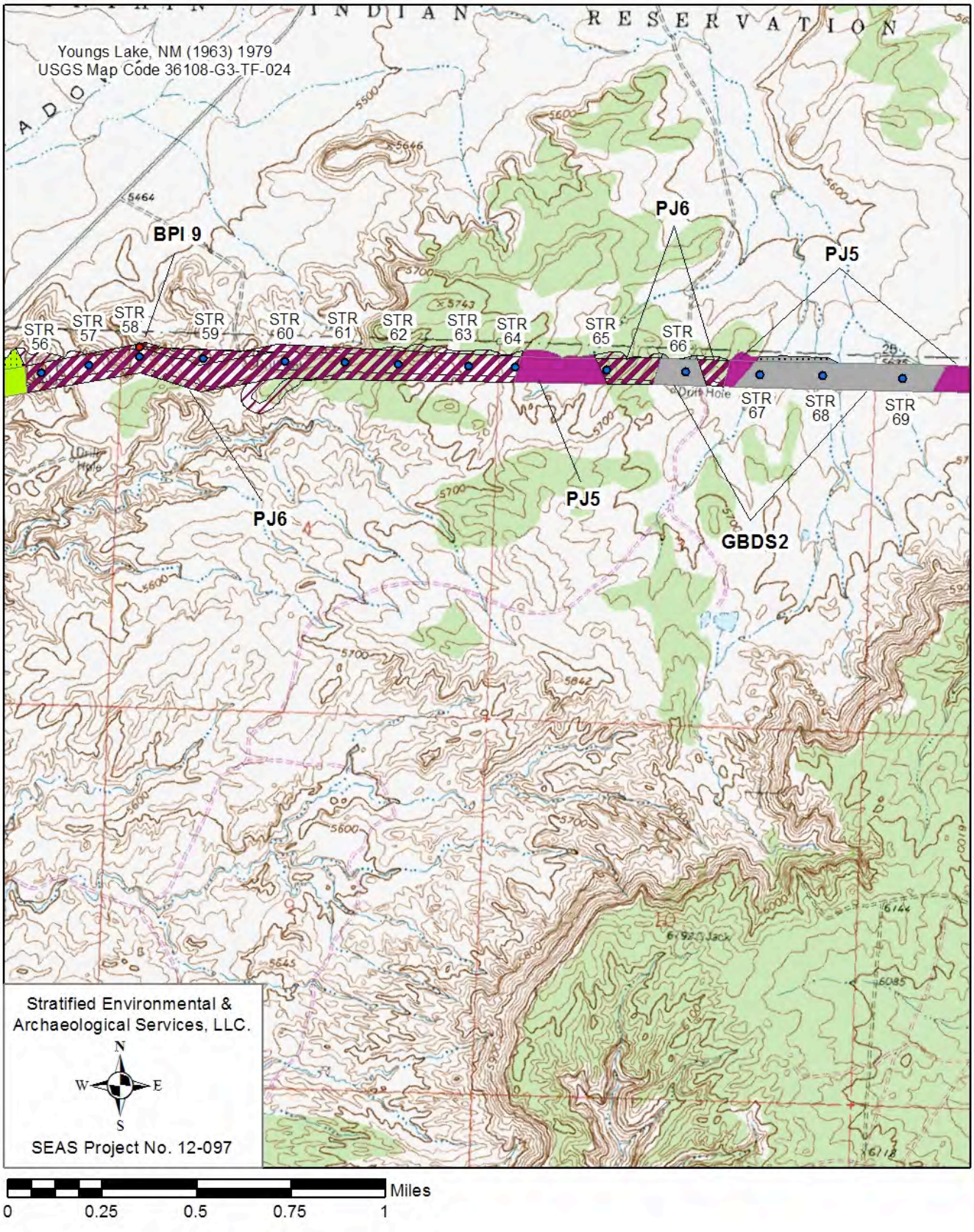

Figure 4.8 Plant Community Map 6: Youngs Lake, NM (1963) 1979 USGS 7.5' Series Quadrangle (1: 24,000 Scale)

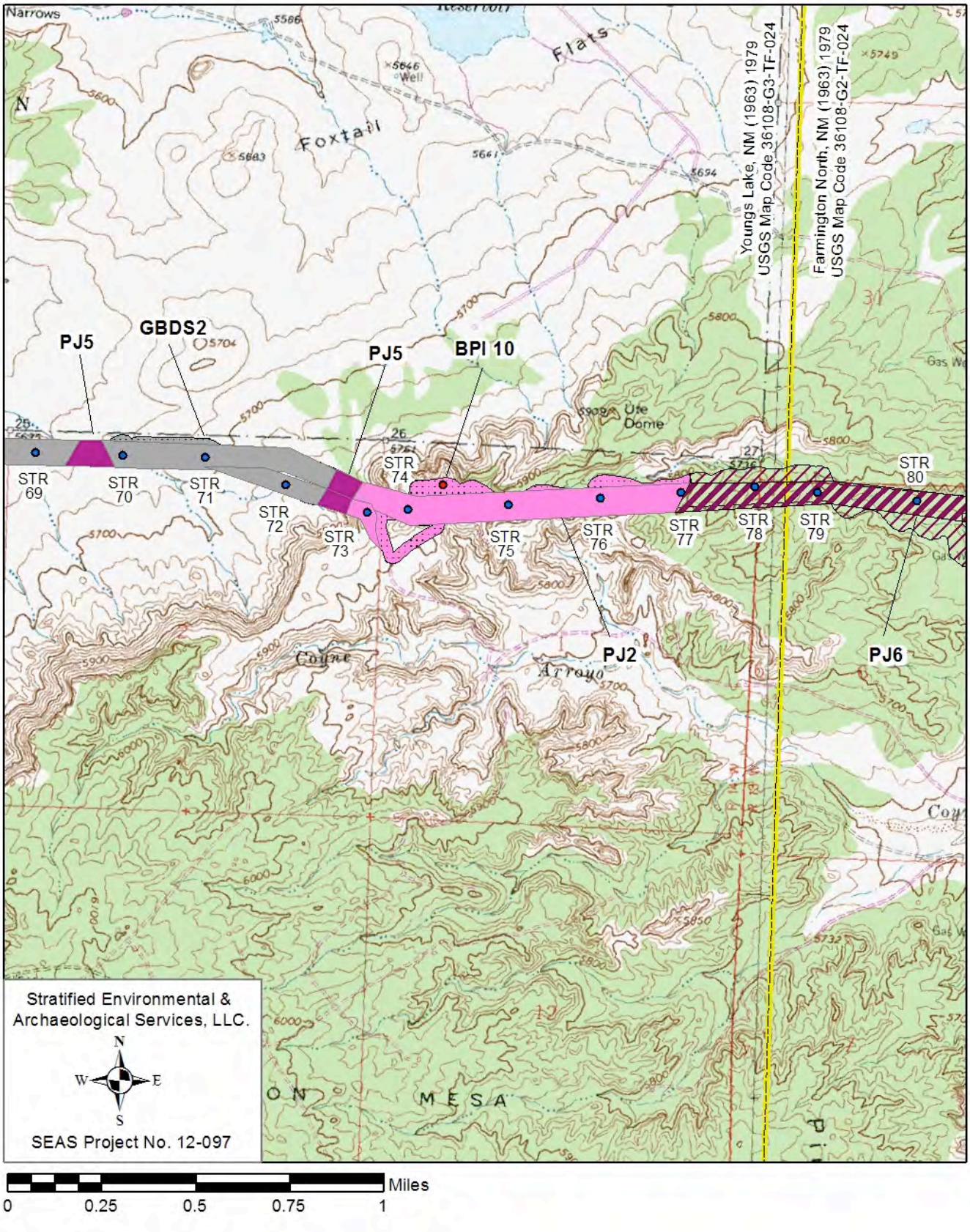

Figure 4.9 Plant Community Map 7: Youngs Lake, NM (1963) 1979 and Farmington North, NM (1963) 1979 USGS 7.5' Series Quadrangles (1: 24,000 Scale)

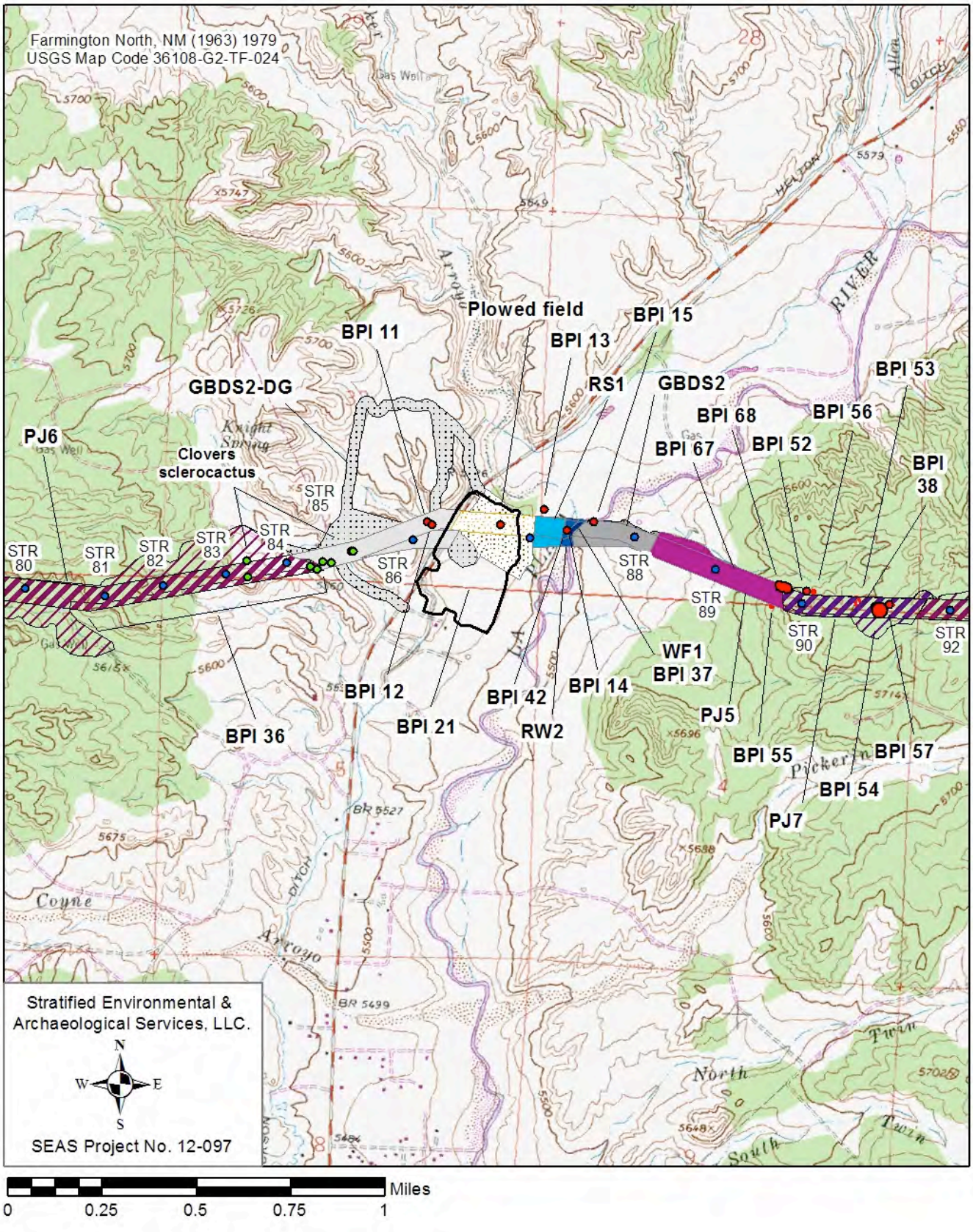

Figure 4.10 Plant Community Map 8: Farmington North, NM (1963) 1979 USGS 7.5' Series Quadrangle (1: 24,000 Scale)

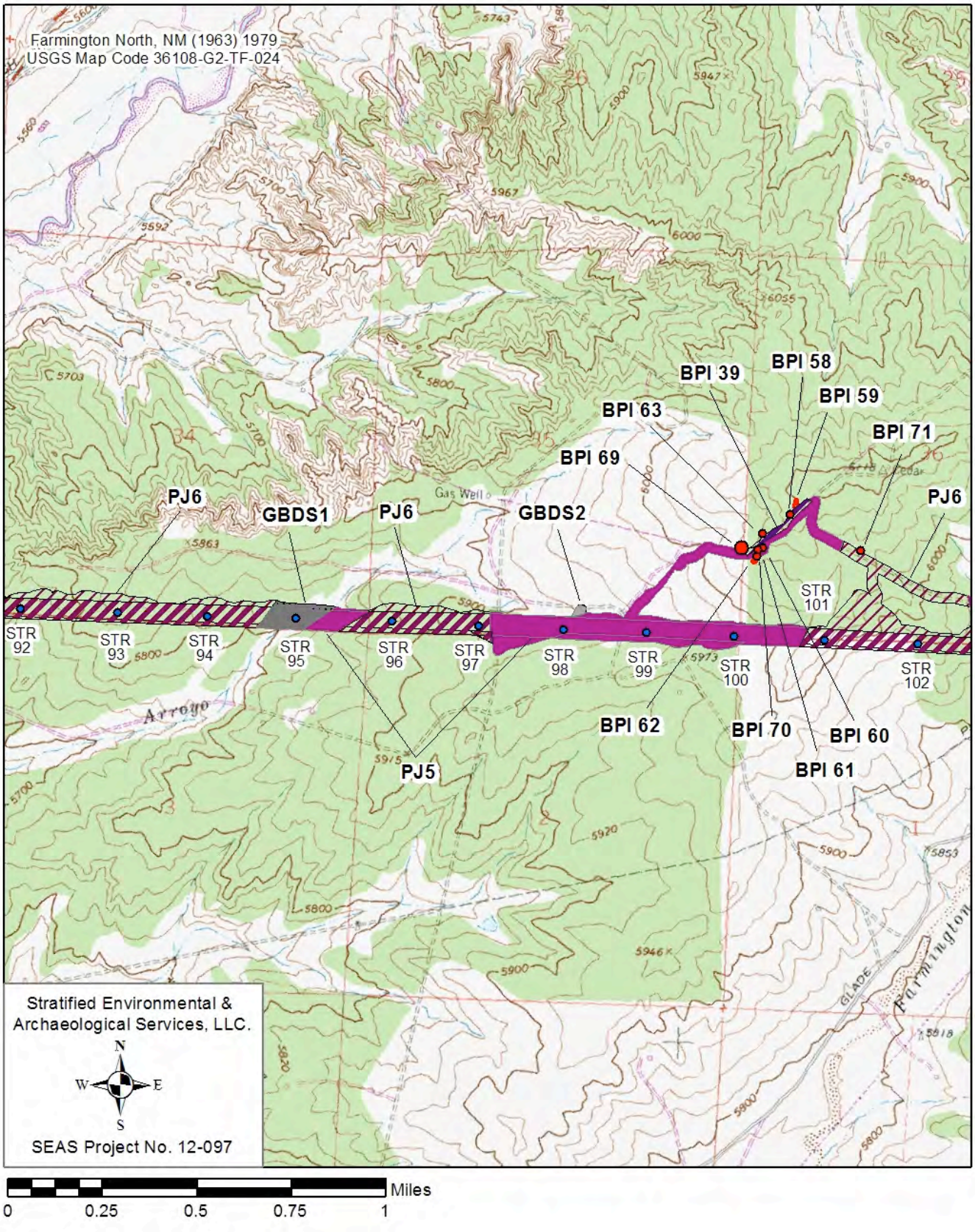

Figure 4.11 Plant Community Map 9: Farmington North, NM (1963) 1979 USGS 7.5' Series Quadrangle (1: 24,000 Scale)

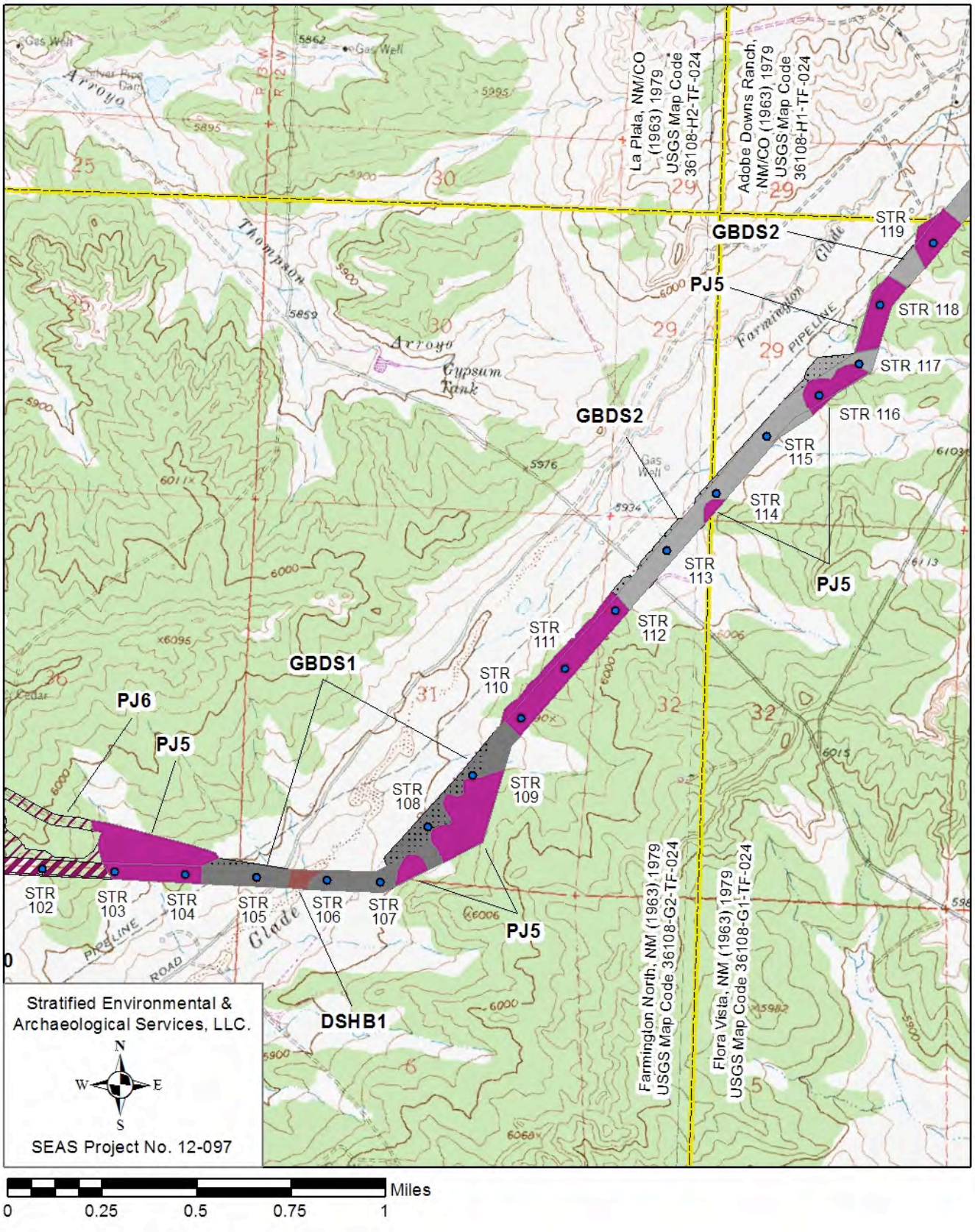

Figure 4.12 Plant Community Map 10: Farmington North, NM (1963) 1979 and Flora Vista, NM (1963) 1979 USGS 7.5' Series Quadrangles (1: 24,000 Scale)

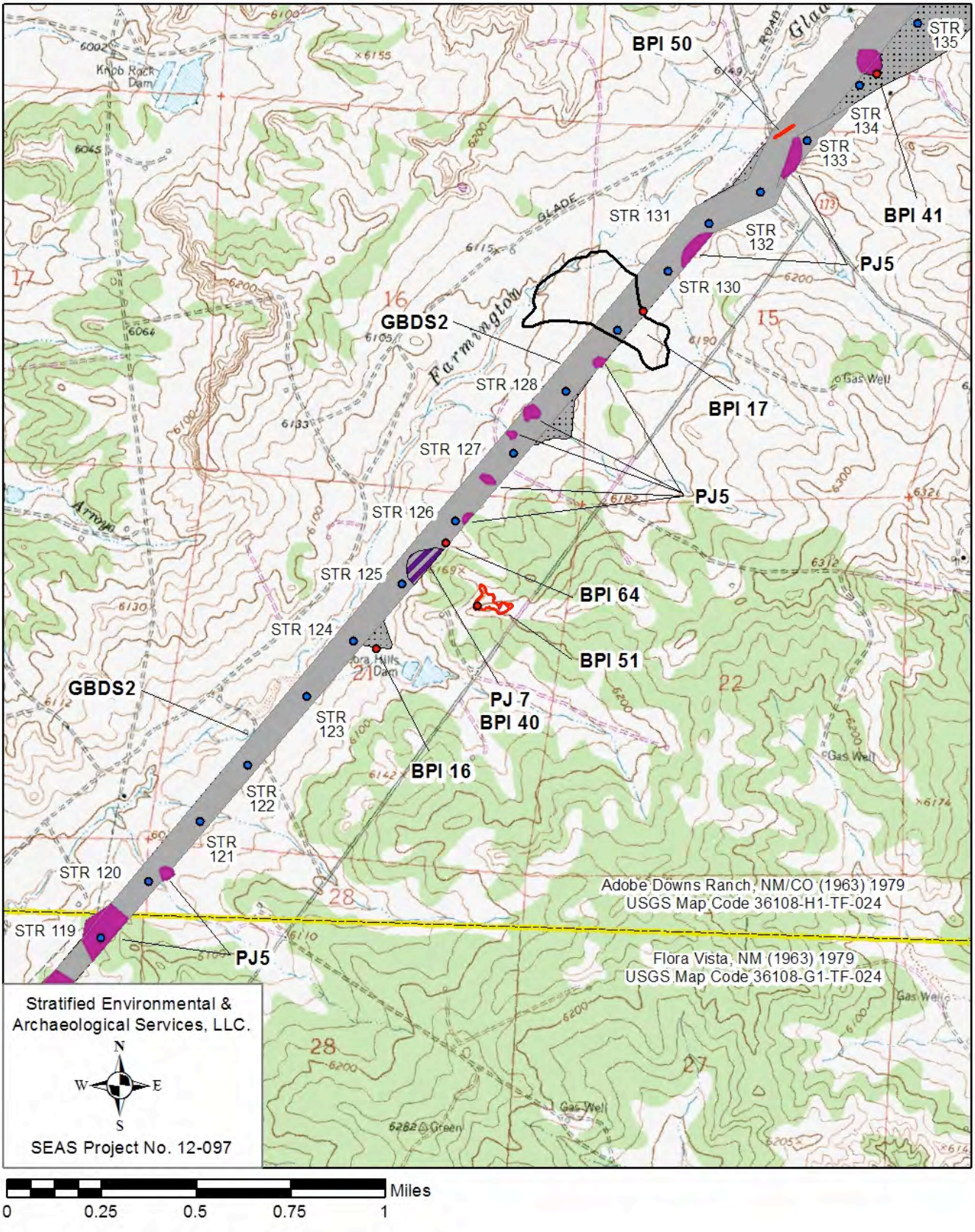

Figure 4.13 Plant Community Map 11: Flora Vista, NM (1963) 1979 and Adobe Downs Ranch, NM (1963) 1979 USGS 7.5' Series Quadrangles (1: 24,000 Scale)

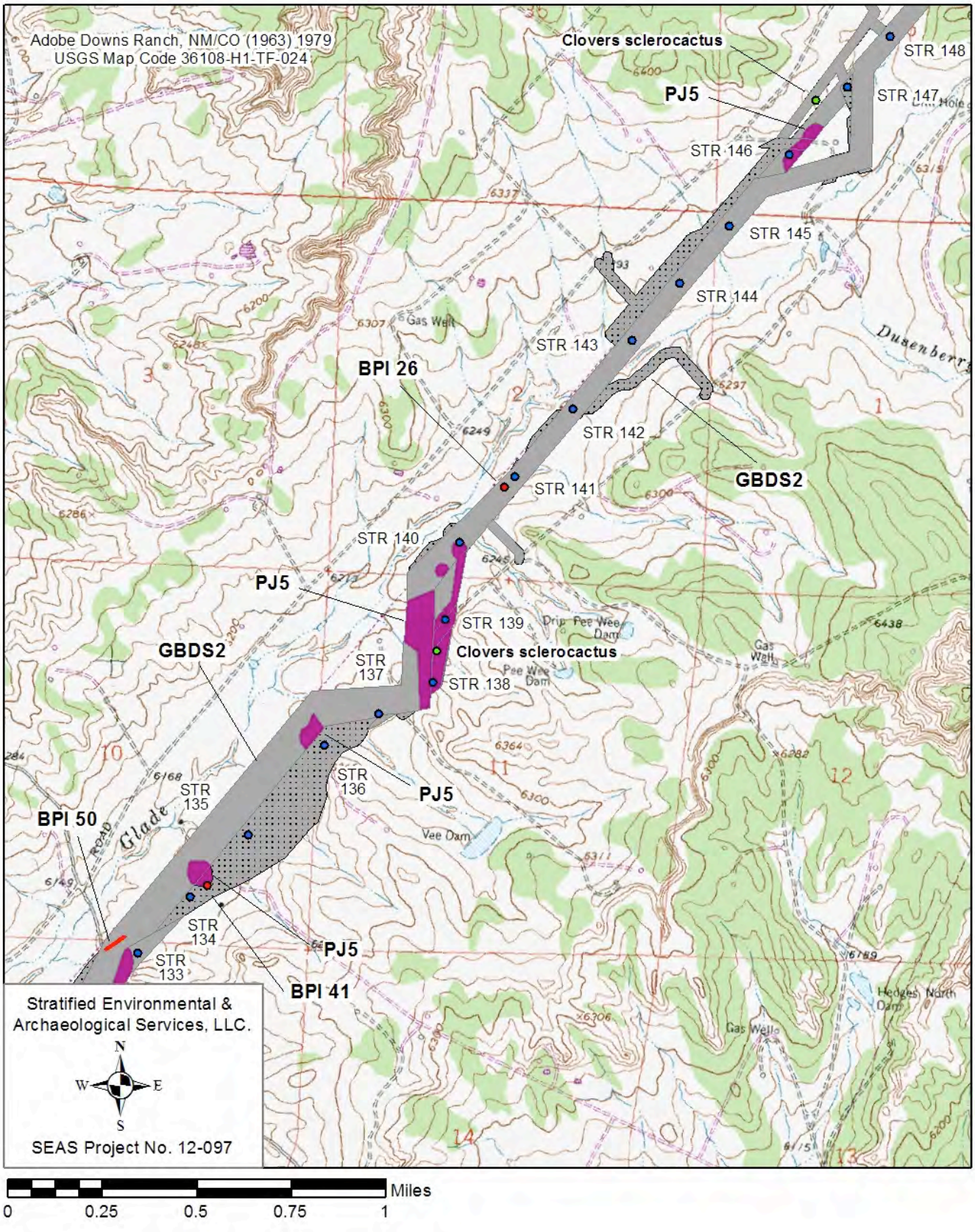

Figure 4.14 Plant Community Map 12: Adobe Downs Ranch, NM (1963) 1979 USGS 7.5' Series Quadrangle (1: 24,000 Scale)

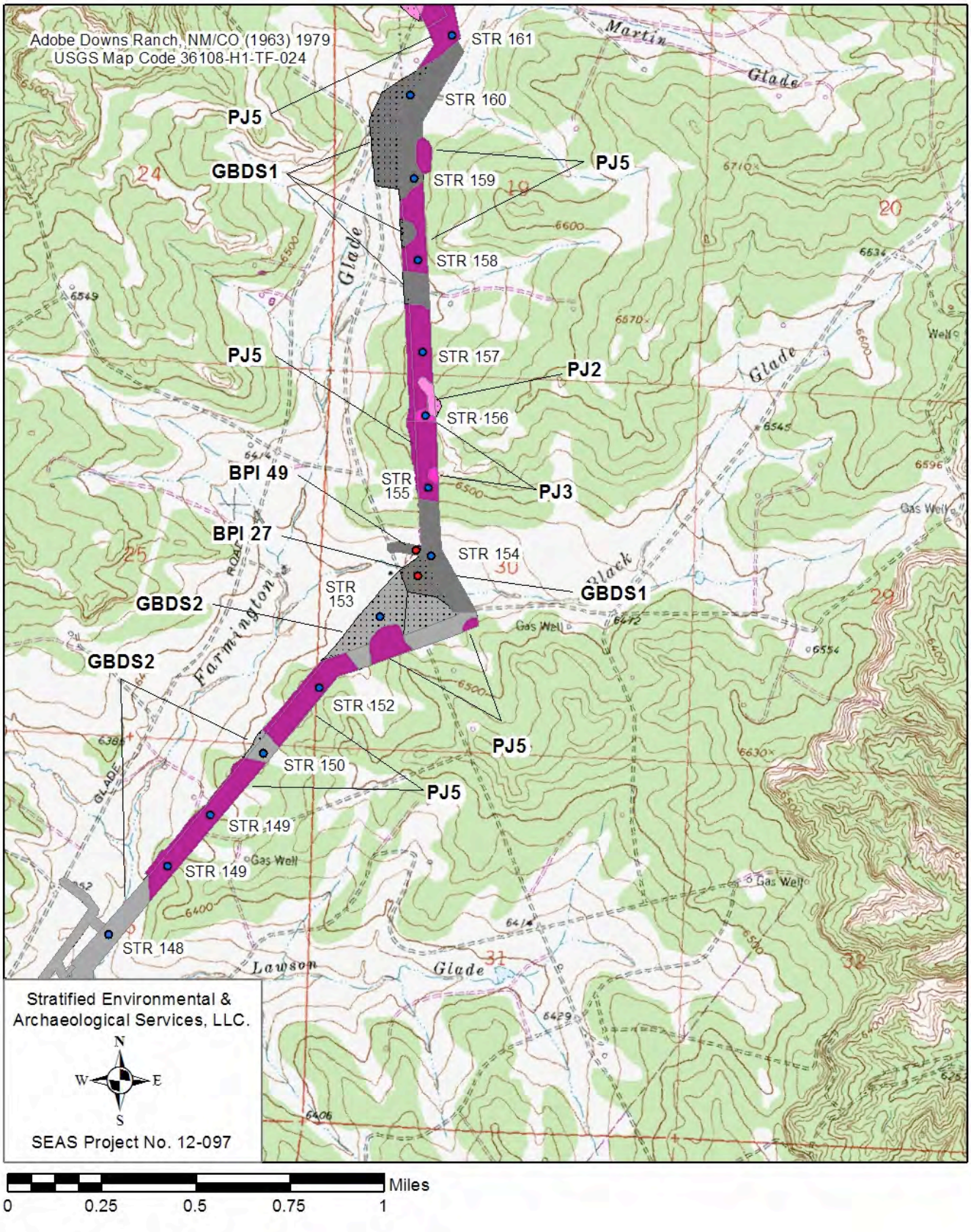

Figure 4.15 Plant Community Map 13: Adobe Downs Ranch, NM (1963) 1979 USGS 7.5' Series Quadrangle (1: 24,000 Scale)

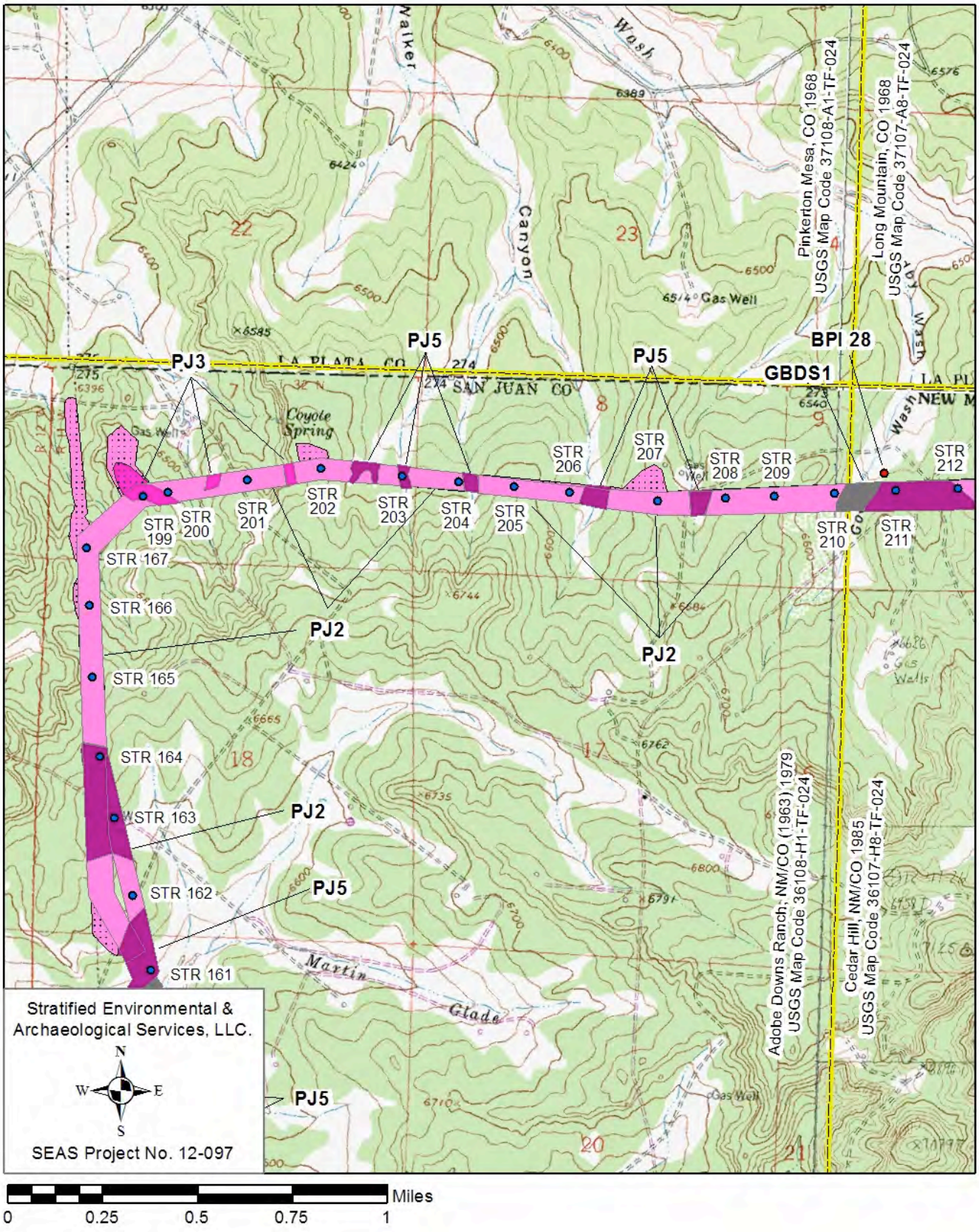

Figure 4.16 Plant Community Map 14: Adobe Downs Ranch, NM (1963) 1979 USGS 7.5' Series Quadrangle (1: 24,000 Scale)

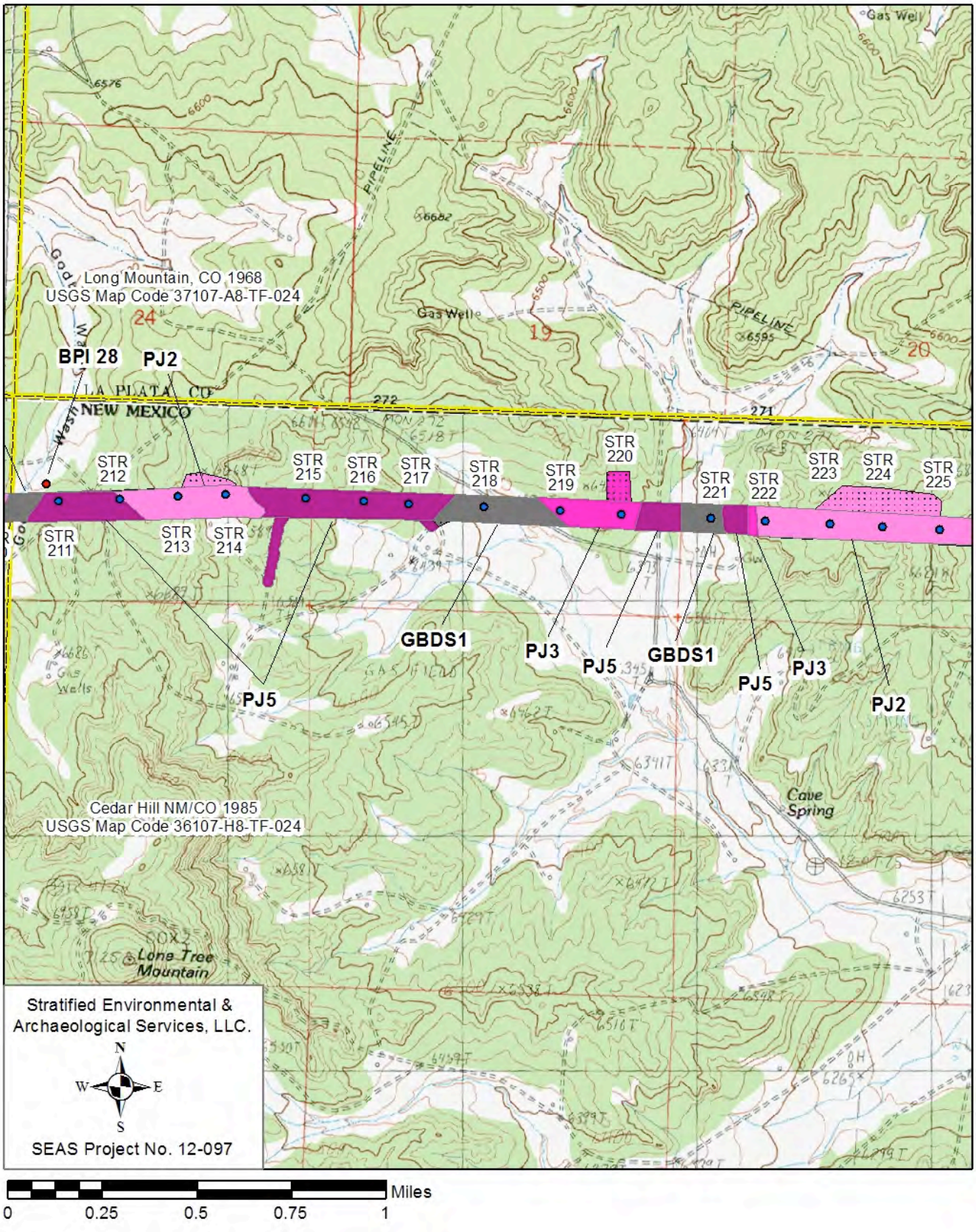

Figure 4.17 Plant Community Map 15: Adobe Downs Ranch, NM (1963) 1979 and Cedar Hill, NM/CO 1985 USGS 7.5' Series Quadrangles (1: 24,000 Scale)

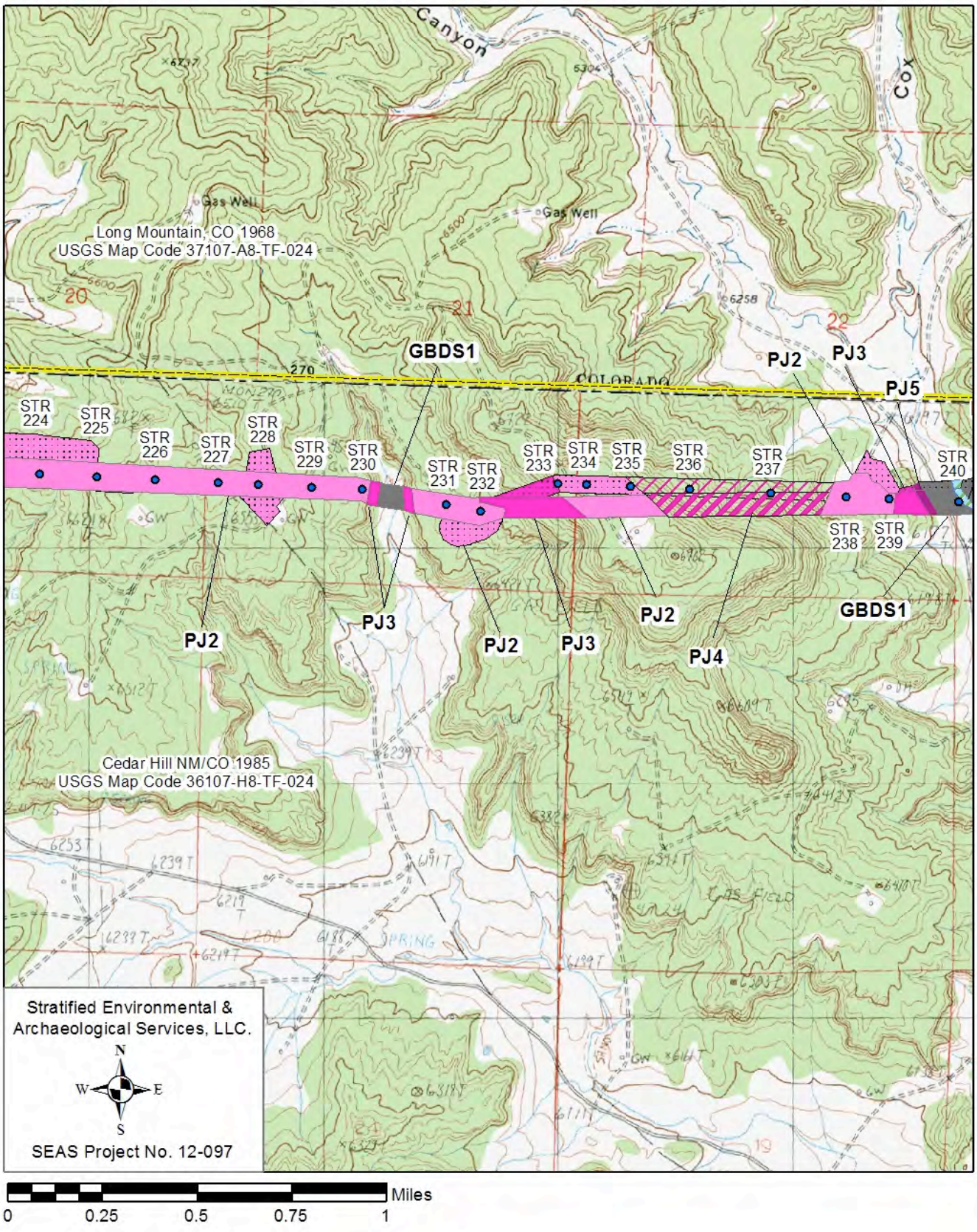

Figure 4.18 Plant Community Map 16: Cedar Hill, NM/CO 1985 USGS 7.5' Series Quadrangle (1: 24,000 Scale)

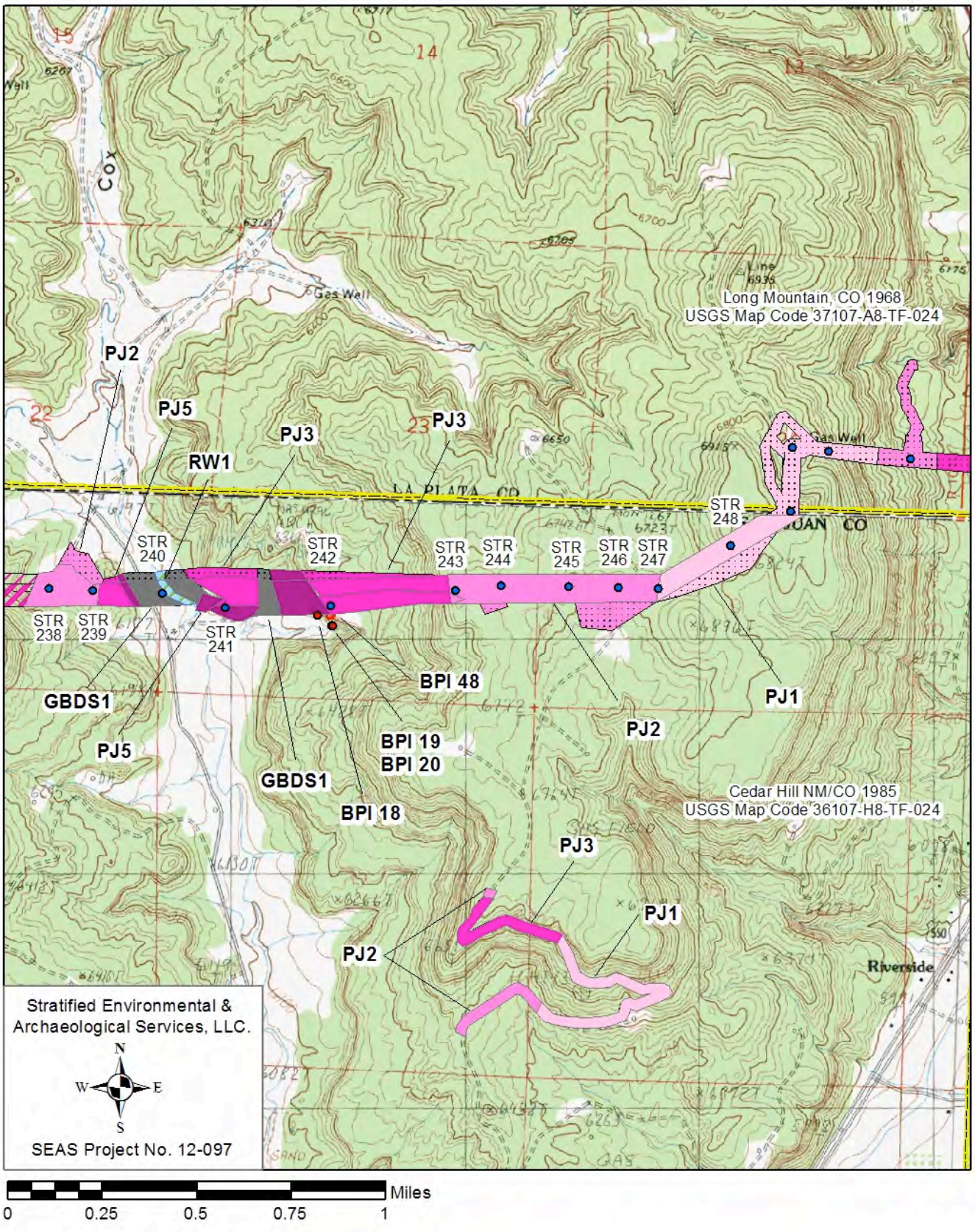

Figure 4.19 Plant Community Map 17: Cedar Hill, NM 1985 and Long Mountain, CO 1968 USGS 7.5' Series Quadrangle (1: 24,000 Scale)

Figure 4.20 View Northeast of Great Basin Desert Scrubland 1 Near Structure 221 (Top) and GBDS 2 Near Confluence of Black Glade With Farmington Glade (Bottom)

Figure 4.21 View North of Desert Shrubland 1 Community Adjacent to Shumway Arroyo (Top) and Salt Desert Scrubland 1 Community Facing West in Structure 51 Vicinity (Bottom)

Figure 4.22 View of Desert Grassland Near Structure 33 Facing East (Top) and View of PJ 1 Woodland Habitat (Bottom)

Figure 4.23 View of PJ 2 Woodland (Top) and PJ 4 Woodland Habitats (Bottom)

Figure 4.24 View of PJ 5 Woodland Just East of La Plata River Crossing (Top) and PJ 6 Woodland on Piñon Mesa With Salt Desert Scrubland Understory (Bottom)

of upland mesas and slopes at higher elevations, while salt desert scrublands occur in these same landscape positions at lower elevations at the west end of the project. Several aspects of mixed woodland habitats occur, and prolonged transitional zones are present as well, typically corresponding with soil type transitions. Many plant species occur in more than one community type. For piñon pine-juniper woodlands, Colorado piñon pine (*Pinus edulis*) tends to be the more dominant tree species in more mesic settings, such as north and east-facing slopes and higher elevations, whereas Utah juniper (*Juniperus osteosperma*) is more dominant in more xeric settings, as on south and west-facing slopes and lower elevations where evapotranspiration rates are much higher. Seven aspects of mixed conifer woodland habitat were identified. Riparian woodland and shrubland habitats only occur in Cox Canyon and on the La Plata River floodplain where soil moisture is capable of supporting such communities. Within the project area, wetland vegetation only occurs on the lower banks of the La Plata River channel as a thin strip, or fringe.

A list of plant species observed in the project area is provided in Table 4.3. However, given the drought conditions of 2012 and early 2013 growing seasons and the timing of the botanical field surveys, many species were not identifiable to the genus level and some species may have remained dormant, or at least not as prolific as during years of average to above average precipitation. Dominant and common species were distinguished based on relative abundance and contribution to the overall vegetation cover of each community type. Species that were infrequently encountered were noted on the respective plant community forms in which they were found. However, the infrequent species do not form the basis of the community descriptions, but they are included in Table 4.3. Vegetation cover was assessed qualitatively with visual assessments of the contribution of each species to the overall vegetation cover of any given community and no quantitative data was collected. It should be noted that the plant community maps distinguish between plant communties delineated in the field by the project biologist and those projected by Parametrix (PMX) utilizing aerial photography.

4.1.1 Great Basin Desert Scrubland 1 (GBDS 1)

Great Basin Desert Scrubland 1 occurs primarily in constricted canyon bottom settings on alluvial terraces and side-slope fans and, less often, on lower slopes of more open valleys where deposition is heavy from excessive slope washing (Figures 4.9 to 4.11, 4.14, and 4.16 to 4.20). Soils tend to be pale brown sand to sandy loam or silt loam and are usually loose, recently deposited, and disturbed soils from heavy grazing on the east side of the project. Biotic soil crusts are absent due to sandy soils, poor soil consolidation, and disturbances. Vegetation cover ranges from 40 to 70 percent. Dense stands of the dominant species, big sagebrush (*Artemisia tridentata*), grow 2.5 to 5 ft high. The understory mostly lacks perennial grass cover, which distinguishes it from Great Basin Desert Scrubland 2. Dominant understory species typically consist of cheatgrass (*Bromus tectorum*), broom snakeweed (*Gutierrezia sarothrae*), and Russian thistle (*Salsola australis*). Common species within the association are comprised of four-wing saltbush (*Atriplex canescens*), rubber rabbitbrush (*Chrysothamnus nauseosus* var. *graveolens*), wolfberry (*Lycium pallidum*), cranesbill (*Erodium cicutarium*), long-flowered gilia (*Ipomopsis longiflora*), pasture sage (*Artemisia ludoviciana*), wild tarragon (*Artemisia dracunculus*), Jim Hill mustard (*Sisymbrium altissimum*), Uintah groundsel (*Senecio multilobatus*), Fremont goosefoot (*Chenopodium fremontii*), variable parsley (*Cymopterus purpureus*), floccose gilia (*Gilia inconspicua*), lambsquarter (*Chenopodium album*), cranesbill (*Erodium cicutarium*), Jim Hill mustard (*Sisymbrium altissimum*), purple hoary aster (*Machaeranthera canescens*), sack saltbush (*Atriplex saccaria*), and James galleta grass (*Hilaria jamesii*).

Table 4.3 Flora of the Project Area

Scientific Name	Common Name
***Aceraceae* (Maple Family)**	
Negundo aceroides Moench	Box elder
***Agavaceae* (Agave Family)**	
Yucca baccata Torrey	Banana yucca
Yucca baileyi Wooton & Standley	Bailey's yucca
Yucca harrimaniae Trelease	Harriman's yucca
***Alliaceae* (Onion Family)**	
Allium macropetalum Rydberg	Large petaled onion
Allium textile Nels. & Macbr.	Textile onion
Androstephium breviflorum Watson	Funnel lily/wild hyacinth
***Amaranthaceae* (Amaranth Family)**	
Amaranthus blitoides Watson	Prostrate pigweed
Amaranthus retroflexus L.	Redroot Pigweed
***Anacardiaceae* (Sumac Family)**	
Rhus aromatica Aiton ssp. *simpliicifolia* (E.L. Greene) Cronquist	Skunkbrush
Rhus aromatica Aiton ssp. *trilobata* (Nuttall) Gray	Skunkbrush
Toxicodendron rydbergia (Small) Greene	Poison Ivy
***Apiaceae* (Parsley Family)**	
Cymopterus acaulis (Pursh) Rafinesque var. *fendleri* (Gray) Goodrich	Fendler's plains spring-parsley
Cymopterus bulbosus Nelson	Indian parsley
Cymopterus purpureus Watson	Variable Spring parsley
***Asclepiadaceae* (Milkweed Family)**	
Asclepias asperula (Decne.) Woodson	Spider milkweed
Asclepias involucrata Engelmann	Dwarf milkweed
Asclepias macrotis Torrey	Longhorn milkweed
Asclepias sanjuanensis Heil, Porter & Welsh	San Juan milkweed
Asclepias speciosa Torrey	Showy milkweed
Asclepias subsubverticillata (Gray) Vail	Whorled/Poison milkweed
***Asteraceae* (Aster Family)**	
Achillea lanulosa Nuttall	Yarrow
Acroptilon repens (L.) de Candolle	Russian knapweed
Agoseris glauca (Pursh) Rafinesque	False dandelion
Ambrosia acanthicarpa Hooker	Bur ragweed
Artemisia bigelovii Gray	Bigelow's sagebrush
Artemisia cana Pursh	Silver sagebrush
Artemisia carruthii Wood	Carruth's wormwood
Artemisia dracunculus L.	Tarragon
Artemisia filifolia Torrey	Sand sagebrush
Artemisia frigida Willdenow	Fringed sage, prairie sagewort
Artemisia ludoviciana Nuttall	Louisiana wormwood
Artemisia novum Nelson	Black sagebrush
Artemisia spinescens Eaton	Budsage
Artemisia tridentata Nuttall	Big sagebrush
Aster falcatus Lindl. in Hook.	Heath/falcate aster
Aster glaucodes Blake	Blueleaf aster
Bahia dissecta (Gray) Britt.	Cutleaf ragweed
Bahia oblongifoloia (Gray) Gray	San Juan bahia
Brickellia californica (Torrey & Gray) Gray	California brickellbush
Brickelia longifolia Watson	Longleaf brickellbush
Brickellia microphylla (Nuttall) A. Gray var. *scabra* A. Gray	Rough brickellbush

Table 4.3 Flora of the Project Area (Continued)

Brickellia oblongifolia Nuttall var. *linifolia* (D.C. Eaton) Robins	Mohave brickellbush
Carduus nutans L.	Musk thistle
Chaenactis douglasii (Hooker) Hooker & Arnott	Dusty maiden
Chaenactis stevioides Hooker & Arnott	Stevia dusty maiden
Chaetopappa ericoides (Torrey) Nesom	Rose heath/ Sand aster
Chrysothamnus depressus Nuttall	Dwarf rabbitbrush
Chrysothamnus greenei (Gray) Greene	Greene's rabbitbrush
Chrysothamnus linifolius Greene	Flax-leaved rabbitbrush
Chrysothamnus nauseosus (Pallus) Britton var. *bigelovii* (Gray) Hall	Bigelow's rabbitbrush
Chrysothamnus nauseosus (Pallus) Britton var. *graveolens* (Nuttall) Hall	Rubber rabbitbrush
Cirsium arvense (L.) Scopoli	Canada thistle
Conyza canadensis (L.) Cronquist	Horseweed
Erigeron divergens Torrey & Gray	Spreading fleabane
Erigeron flagellaris Gray	Trailing fleabane
Erigeron pulcherrimus Heller	Basin daisy
Erigeron pumilus Nuttall	Vernal daisy
Grindelia squarrosa (Pursh) Dunal	Gumweed
Gutierrezia sarothrae (Pursh) Britton & Rusby	Broom snakeweed
Helianthus annuus L.	Common sunflower
Heterotheca villosa (Pursh) Shinners	Hairy goldenaster
Hymenopappus filifolius Hooker	Common hyalineherb
Hymenoxys richardsonii (Hooker) Cockerell	Richardson's bitterweed
Lactuca serriola L.	Prickly lettuce
Lygodesmia grandiflora (Nuttall) Torrey & Gray var. *arizonica* (Tomb) Welsh	Arizona rushpink
Machaeranthera canescens (Pursh) Gray	Hoary aster
Machaeranthera gracilis (Nuttall) Shinners	Slender goldenaster
Machaeranthera grindeloides (Nuttall) Shinn.	Gumweed aster
Machaeranthera pinnatifida (Hook.) Shinners	Lacy tansyaster
Petrodoria pumila (Nuttall) Greene var. *pumila*	Rock goldenrod
Prenanthella exigua (A. Gray) Rydb.	Prenanthella
Senecio douglasii DC ssp. *longilobus* (Bentham) L. Benson	Threadleaf groundsel
Senecio multilobatus Torrey & Gray	Uinta groundsel
Senecio ridellii Torrey & Gray	Riddell's groundsel
Solidago canadensis L.	Canada goldenrod
Solidago missouriensis Nuttall	Missouri goldenrod
Stenotus armeroides Nuttall	Thrifty goldenweed/ ring grass
Stephanomeria exigua Nuttall	Annual skeletonweed
Stephanomeria pauciflora (Torrey) A. Nelson	Skeletonweed, few-flowered wire lettuce
Tetradymia canescens de Candolle	Horsebrush
Tetradymia spinosa Hooker & Arnott	Cottonthorn,/Spiny horsebrush
Tetraneuris acaulis (Pursh) Greene	Bitterweed
Tetraneuris ivesiana Greene	Ive's bitterweed
Thelesperma megapotamicum (Spreng.) Kuntz.	Rio Grande greenthread
Thelesperma subnudum A. Gray	Navajo tea
Townsendia annua Beaman	Annual Easter daisy
Townsendia incana Nuttall	Silvery townsendia
Tragopogon dubius (Scopoli) ssp *major* (Jacquinn) Vollmann	Western salsify
Verbesina encelioides (Cavanilles) Bentham	Crownbeard/Cowpen daisy
Wyethia scabra Hooker	Rough mulesears
Xanthium strumarium L.	Cocklebur

Table 4.3 Flora of the Project Area (Continued)

***Berberidaceae* (Barberry Family)**	
Mahonia repens (Lindley) Don	Creeping Oregon grape
***Boraginaceae* (Borage Family)**	
Cryptantha spp.	Cryptantha
Cryptantha bakeri (Greene) Payson	Baker's cryptanth
Cryptantha cinera (Torrey) Cronquist var *jamesii* (Payson) Cronquist	Bow-nut cryptantha
Cryptantha crassisepala (Torrey & Gray) Greene	Hiddenflower
Cryptantha flava (Nelson) Payson	Yellow hiddenflower
Cryptantha fulvocanescens (S. Wats.) Payson	Yellow-hair cryptanth
Cryptantha gracilis Osterhout	Gracile hiddenflower
Cryptantha micrantha (Torr.) Johnst.	Dye cryptanth
Cryptantha pterocarya (Torr.) E. L. Greene	Wing-nut cryptanth
Cryptantha recurvata Cov.	Recurved cryptanth
Lappula redowskii (Hornem.) Greene	Stickseed
Lithospermum multiflorum Torrey	Wayside gromwell
***Brassicaceae* (Mustard Family)**	
Alyssum alyssoides	Yellow alyssum
Alyssum desertorum Stapf	Desert alyssum
Arabis holboellii Hornem. var. *fendleri* Gray	Fendler rockcress
Arabis pulchra Jones var. *pallens* Greene	Pretty rockcress
Camelina microcarpa Andrz. Ex DC.	Smallseed falseflax
Descurainea obtusa (L.) P. Webb	Tansy mustard
Descurainia pinnata (Walt.) Britton	Tansy mustard
Descurainia sophia (L.) Webb	Flixweed
Dithyrea wislizenii Englemann	Spectacle pod
Draba cuneifolia Nuttall ex Torrey and Gray	Wedgeleaf draba
Erysimum capitatum (Douglas) Greene	Western wallflower
Erysimum cheiranthoides L.	Tall wallflower
Erysimum repandum L.	Spreading wallflower
Lepidium lasiocarpum Nuttall ex Torrey & Gray.	Hispidcress
Lepidium montanum Nuttall	Pepperweed
Lepidium perfoliatum L.	Clasping peppergrass
Lesquerella fendleri (Gray) Watson	Fendler bladderpod
Lesquerella rectipes Wooton & Standley	Bladderpod
Schoenocrambe linifolia (Nuttall) Greene	Skelton mustard
Sisymbrium altissimum L.	Jim Hill mustard
Stanleya pinnata (Pursh) Britton	Prince's plume
Streptanthella longirostris (Watson) Rydberg	Longbeak, little twistflower
Streptanthus cordatus Nuttall	Heartleaf twistflower
Thelypodiopsis aurea Eastwood	Durango tumble mustard
***Cactaceae* (Cactus Family)**	
Coryphantha vivipara (Nuttall) Britton & Rose	Nuttall's pincushion/ nipple cactus
Cylindropuntia whipplei (Engelmann & Bigelow) Kunth	Whipple's cholla
Echinocereus coccineus Engelmann	Scarlet beehive cactus
Echinocereus triglochidiatus Engelmann	Claret cup cactus
Opuntia erinicea Engelmann & Bigelow	Fig prickly pear
Opuntia macrorhiza Englemann	Plains prickly pear
Opuntia phaeacantha Haworth	Engelmann prickly pear
Opuntia polyacantha Haworth	Plains/Central prickly pear
Sclerocactus cloveriae Heil & Porter	Clover's sclerocactus
Sclerocactus cloveriae Heil & Porter var. *brackii* Heil & Porter	Brack hardwall cactus
Sclerocactus parviflorus Clover and Jotter var. *intermedius* (Peebles) Woodruff & Benson	Devil claw

Table 4.3 Flora of the Project Area (Continued)

***Calochortaceae* (Mariposa Family)**	
Calochortus flexuosus Watson	Twisted sego lily
Calochortus nuttailii Torrey & Gray	Sego lily
Calochortus gunnisonii Watson	Gunnison mariposa lily
***Capparaceae* (Caper Family)**	
Cleome lutea Hooker	Yellow beeplant
Cleome serrulata Pursh	Rocky Mountain beeplant
***Caryophyllaceae* (Pink Family)**	
Arenaria fendleri Gray var. *aculeata* (Watson) Welsh	Sharpleaf desert sandwort
***Chenopodiaceae* (Goosefoot Family)**	
Atriplex argentea Nuttall	Silver saltbush
Atriplex canescens (Pursh) Nuttall	Four-wing saltbush
Atriplex confertifolia (Torrey & Fremont) Watson	Shadscale
Atriplex corrugata Watson	Mat saltbush
Atriplex gardneri (Moq.) D. Dietr.	Gardner's saltbush
Atriplex obovata Moquin	New Mexico saltbush
Atriplex powelii Watson	Powell's saltweed
Atriplex rosea L.	Red scale/ Red orache
Atriplex saccaria S. Wats.	Sack saltbush
Ceratoides lanata (Pursh) J.T. Howell	Winterfat
Chenopodium album L.	Lambsquarters
Chenopodium fremontii Watson	Fremont goosefoot
Chenopodium incanum (Wats.) Heller	Mealy goosefoot
Chenopodium neomexicanum Standl.	New Mexico goosefoot
Chenopodium glaucum L.	Goosefoot/ Lamb's quarter
Chenopodium leptophyllum (Moquin) Watson	Narrowleaf lamb's quarter
Halogenton glomeratus (Bieberstein) Meyer	Halogenton, wienerleaf
Kochia americana Watson	Gray Molly
Kochia scoparia (L.) Schrader	Summer cypress
Monolepis nuttalliana (Schultes) E. L. Greene	Povertyweed
Suaeda moquinii Torrey	Mohave seepweed
Suaeda sp.	Seepweed
Sarcobatus vermiculatus (Hooker) Torrey	Black greasewood
Salsola australis R. Brown	Prickly Russian thistle
Salsola paulsenii Litv.	Barbwire Russian thistle
***Convolvulaceae* (Morning Glory Family)**	
Convolvulus arvensis L.	Bindweed
Evolvulus nuttallianus Schultes	Hairy evolvulus
***Cupressaceae* (Cypress Family)**	
Juniperus osteosperma (Torrey) Antoine	Utah juniper
Juniperus scopulorum (Sargent) Rydberg	Mountain juniper
Juniperus scopulorum x *J. osteosperma*	Hybrid juniper
***Cyperaceae* (Sedge Family)**	
Scirpus pungens Vahl	American three-square
***Elaeagnaceae* (Oleaster Family)**	
Elaeagnus angustifolia L.	Russian olive
***Ephedraceae* (Ephedra Family)**	
Ephedra torreyana Watson	Torrey's ephedra
Ephedra viridis Coville	Mormon tea
Ephedra viridis Coville var. *viscida* (Cutler) Benson	Cutler's ephedra
***Euphorbiaceae* (Spurge Family)**	
Chamaesyce fendleri (Torrey & Gray) Small	Fendler's creeping fig
Chamaesyce glyptosperma (Engelmann) Small	Creeping fig, ridge-seeded spurge

Table 4.3 Flora of the Project Area (Continued)

***Fabaceae* (Pea Family)**	
Astragalus amphioxys Gray var. *amphioxys*	Crescent milkvetch
Astragalus calycosus Torrey	Torrey milkvetch
Astragalus ceramicus Sheldon	Painted milkvetch
Astragalus cottamii Welsh	Cottam's milkvetch
Astragalus flavus Nuttall ex T & G var. *candicans*	White milkvetch
Astragalus lonchocarpus Torrey	Great rushy milkvetch
Astragalus missouriensis Nuttall	Missouri milkvetch
Astragalus mollissimus Torrey var. *thompsonae* (Watson) Barneby	Woolly locoweed
Astragalus naturitensis Payson	Naturita milkvetch
Astragalus newberryi Gray	Newberry's milkvetch
Astragalus nuttallianus	Nuttall's small-flowered milkvetch
Astragalus pattersonii Gray	Patterson's milkvetch
Astragalus praelongus Sheldon	Stinking milkvetch
Astragalus proximus (Rydberg) Wooton & Standley	Aztec milkvetch
Lotus wrightii (Gray) Greene	Deervetch/Wright's trefoil
Lupinus brevicaulis Watson	Short-stemmed lupine
Lupinus caudatus Kellogg	Spurred lupine
Lupinus pusillus Pursh	Dwarf lupine
Lupinus argenteus Pursh	Silvery lupine
Meliotus officinalis (L.) Lamarck	Yellow sweetclover
Pediomelum megalanthum (Wooton & Standley) Rydberg	Indian potato
***Fagaceae* (Oak Family)**	
Quercus gambelii Nuttall	Gambel oak
***Frankeniaceae* (Frankenia Family)**	
Frankenia jamesii Torrey	Alkali heath
***Geraniaceae* (Geranium Family)**	
Erodium cicutarium (L.) L'Heritier	Crane's bill
***Hydrangeaceae* (Hydrangea Family)**	
Fendlera rupicola Gray	Cliff fendlerbush
***Hydrophyllaceae* (Waterleaf Family)**	
Phacelia alba Rydb.	White scorpionweed
Phacelia crenulata (Torrey) var. *corrugata* (A. Nelson)	Corrugated scorpionweed
Phacelia ivesiana Torrey in Ives	Ive's phacelia
***Lamiaceae* (Mint Family)**	
Marrubium vulgare L.	Horehound
***Loasaceae* (Loasa Family)**	
Mentzelia albicaulis (Hooker) Torrey & Gray	Whitestem blazingstar
Mentzelia humilus (Gray) Rydberg	Skeletonleaf blazingstar
Mentzelia multiflora (Nuttall) Gray	Desert stickleaf
Mentzelia sivinskii Schenk & Hufford	Sivinski's blazingstar
***Malvaceae* (Mallow Family)**	
Sphaeralcea cocinnea (Nuttall)	Scarlet globemallow
Sphaeralcea fendleri A. Gray	Fendler globemallow
Sphaeralcea hastulata Gray	Wrinkled globemallow
Sphaeralcea parvifolia Nelson	Nelson's globemallow
***Nyctaginaceae* (Four-O'clock Family)**	
Abronia bolackii Atwood, Welsh & Heil	Bolack's sand verbena
Abronia fragans Nuttall	Sand verbena
Mirabilis linearis (Pursh) Heimerl	Narrowleaf umbrellawort
Mirabilis multiflora (Torrey) Gray	Many-flowered four o'clock
Tripterocalyx carneus (E. L. Greene) Galloway	Wooton sand verbena
Tripterocalyx micranthus (Torrey) Hooker	Pink sandpuffs

Table 4.3 Flora of the Project Area (Continued)

Oleaceae Family **(Olive Family)**	
Forestiera pubescens Nuttall	New Mexico olive
Fraxinus anomala Torrey	Single-leaf ash
Onagraceae **(Evening Primrose Family)**	
Camissonia scapoides (Torrey & Gray) Raven	Scapose camissonia
Camissonia walkeri (A. Nelson) Raven	Walker's camissonia
Oenothera albicaulis Pursh	Prairie evening primrose
Oenothera caespitosa Nuttall	Evening primrose
Oenothera coronopifolia Torr. & Gray	Evening primrose
Orobanchaceae **(Broom-rape Family)**	
Orobanche fasciculata Nuttall	Broom-rape
Orobanche multiflora Nuttall	Many flowered broom-rape
Pinaceae **(Pine Family)**	
Pinus edulis Engelmann	Colorado piñon pine
Plantaginaceae **(Plantain Family)**	
Plantago patigonica Jacquin	Woolly plantain
Poaceae **(Grass Family)**	
Agropyron cristatum (L.) Gaertner	Crested wheatgrass
Agropyron desertorum (Fisch.) Schult.	Desert crested wheatgrass
Agrostris exarata Trinius var. *minor* Hooker	Spike bentgrass
Agrostis gigantea Roth	Redtop bentgrass
Aristida purpurea Nuttall	New Mexico three-awn
Bouteloua barbata Lag.	Six weeks grama
Bouteloua eriopoda (Torrey) Torrey	Black grama
Bouteloua gracilis (Hum., Bonp. & Kunth) Lagasca	Blue grama
Bouteloua hirsuta Lagasca	Hairy grama
Bouteloua simplex Lag.	Mat grama
Bromus inermis Leyss.	Smooth brome
Bromus japonicus	Japanese brome
Bromus tectorum L.	Cheatgrass
Cenchrus spinifex Cavanilles	Common sandbur
Disticlis spicata (L.) Greene	Inland saltgrass
Echinocholoa crus-galli L. P. Beauvois	Barnyard grass
Elymus elongatus (Host) Runem.	Tall wheatgrass
Elymus elymoides (Raf.) Swezey	Bottlebrush squirreltail
Elymus hispidus (Opiz) Melderis	Intermediate wheatgrass
Elymus smithii (Rydberg) Gould	Bluestem wheatgrass
Elymus trachycaulus (Link) Gould	Roughstem wheatgrass
Elymus triticoides Buckley	Creeping wild-rye
Eremopyrum triticeum (Gaertner) Nevski	Annual wheatgrass
Erioneuron pulchellum (HBK) Tateoka	Fluffgrass
Festuca pratensis Hudson	Meadow fescue
Hilaria jamesii (Torrey) Bentham	Galleta grass
Hordeum jubatum L.	Foxtail barley
Koeleria macrantha (Ledebour) Schultes	Junegrass
Muhlenbergia asperifolia (Nees & Meyen) Parodi	Meadow/alkali muhly
Muhlenbergia porteri Schribner	Porter's muhly
Muhlenbergia pungens Thurber	Sandhill muhly
Munroa squarrosa (Nuttall) Torrey	False buffalograss
Oryzopsis hymenoides (Roem. & Schult.) Ricker	Indian ricegrass
Oryzopsis micrantha (Trinius & Ruprecht) Thurber	Delicate ricegrass
Panicum capillare L.	Witchgrass
Phalaroides arundinacea (L.) Rauschert	Reed canarygrass
Poa fendleriana (Steud.) Vasey	Mutton grass

Table 4.3 Flora of the Project Area (Continued)

Poa palustris L.	Swamp/ Fowl bluegrass
Sporobolus airoides (Torrey) Torrey	Alkali sacaton
Sporobolus contractus Hitchcock	Spike dropseed
Sporobolus cryptandrus (Torrey) Gray	Sand dropseed
Sporobolus flexuous (Thurb.) Rydberg	Mesa dropseed
Stipa comata Trinius & Ruprecht	Needle and thread
Stipa robusta (Vasey) Scribn.	Sleepygrass
Stipa speciosa Trinius & Ruprecht	Desert needlegrass
Vulpia octaflora (Walter) Rydberg	Six-weeks fescue
***Polemoniaceae* (Phlox Family)**	
Aliciella formosa (Greene) Porter	Aztec gilia
Eriastrum diffusum (Gray) Mason	Woolstar, spreading eriastrum
Gilia haydenii Gray	Hayden's gilia
Gilia inconspicua (J.E. Sm.) Sweet	Floccose gilia
Gilia leptomeria Gray	Common gilia
Gilia opthalmoides Brand	Gilia
Gilia polycladon Torrey	Spreading gilia
Gilia sinuata Douglas	Gilia
Gilia triodon Eastwood	Gilia
Ipomopsis aggregata (Pursh) Grant	Scarlet gilia
Ipomopsis congesta (Hooker) Grant var. *frutescens* (Rydberg) Welsh	Shrubby gilia
Ipomopsis longiflora (Torrey) Grant	Long-flowered gilia/trumpet gilia
Ipomopsis multiflora Nuttall	Many-flowered gilia
Ipomopsis pumila (Nuttall) Grant	Dwarf false gilia
Leptodactylon pungens Torrey) Nuttall	Prickly gilia
Phlox austromontana Cov.	Desert mountain phlox
Phlox hoodii Richardson	Hood's phlox
Phlox longifolia Nuttall	Long-leaved phlox
***Polygalaceae* (Milkwort Family)**	
Polygala subspinosa Watson	Cushion milkwort
***Polygonaceae* (Buckwheat Family)**	
Eriogonum alatum Torrey	Winged buckwheat
Eriogonum corymbosum Bentham	Corymb buckwheat
Eriogonum divaricatum Hooker	Spreading buckwheat
Eriogonum gordonii Bentham	Gordon's buckwheat
Eriogonum jamesii Bentham	James buckwheat
Eriogonum leptophyllum (Torrey) Woot. &Standl.	Slenderleaf buckwheat
Eriogonum lonchophyllum Torrey & Gray var. *nudicaule*	Longleaf buckwheat
Eriogonum microthecum Nuttall var. *simpsonii* (Bentham) Reveal	Slender buckwheat
Eriogonum ovalfolium Nuttall	Oval-leaf buckwheat
Eriogonum racemosum Nuttall	Redroot buckwheat
Eriogonum salsuginosum (Nuttall) Hooker	Smooth buckwheat
Eriogonum wetherillii (Eastwood)	Wetherill's buckwheat
Polygonum arenastrum Bourgeau	Devil's shoestring
Rumex hymenosepalus Torrey	Canaigre
***Portulaceae* (Purslane Family)**	
Portulaca oleraceae L.	Common purslane
***Primulaceae* (Primrose Family)**	
Androsace occidentalis Pursh	Rock jasmine
Androsace septentrionalis L.	Rock jasmine
***Ranunculaceae* (Buttercup Family)**	
Clematis ligusticifolia Nuttall	Western virgin's bower

Table 4.3 Flora of the Project Area (Continued)

Delphinium andersonii Gray var. *scaposum* (Greene) Welsh	Pale larkspur
Ranunculus testiculatus Crantz.	Bur buttercup
***Rosaceae* (Rose Family)**	
Amelanchier utahensis Koehne	Utah serviceberry
Cercocarpus montanus Rafinesque	Mountain mahogany
Purshia tridentata (Pursh) de Candolle	Bitterbrush
Rosa woodsii Lindley	Wood's rose
***Salicaceae* (Willow Family)**	
Populus deltoides Marshall ssp *wizlizenii* (Watson) Eckenwalder	Valley cottonwood
Salix exigua Nuttall	Sandbar willow
***Santalaceae* (Sandalwood Family)**	
Comandra umbellata (L.) Nuttall	Bastard toadflax
***Scrophulariaceae* (Figwort Family)**	
Castilleja chromosa Nelson	Desert paintbrush
Cordylanthus wrightii Gray	Club flower
Pedicularis centranthera Gray	Prickle lousewort
Penstemon breviculus (Keck) Nisbet & Jackson	Narrow-mouth penstemon
Penstemon angustifolius Pursh	Taperleaf penstemon
Penstemon linarioides Gray ssp *coloradoensis* (A. Nels.) Keck	Linaria penstemon
Verbascum thapsus L.	Mullein
***Solanaceae* (Nightshade Family)**	
Lycium pallidum Miers	Wolfberry
Solanum elaeagnifolium Cavanilles	Silverleaf nightshade
Solanum rostratum Dunal	Buffalo bur
***Tamaricaceae* (Tamarisk Family)**	
Tamarix ramosissima Ledebour	Tamarisk/ Salt cedar
***Ulmaceae* (Elm Family)**	
Ulmus pumila L.	Chinese elm
***Verbenaceae* (Vervain Family)**	
Verbena bracteata Lagasca & Rodriguez	Prostrate verbena
***Zygophyllaceae* (Caltrop Family)**	
Tribulis terrestris L.	Puncturevine

4.1.2 Great Basin Scrubland 2 (GBDS 2)

This version of Great Basin desert scrubland occurs in open valleys and extensive fans where more consolidated soils occur (Figures 4.7. 4.9, 4.11 to 4.14, and 4.20). Scrubs have greater spacing and the understory has a range-like character. The substrate is usually characterized by light brown silt loam and fine sandy loam alluvium lacking gravels. The soils are deep and well-drained to moderately drained, although not excessively drained as seen in Great Basin Desert Scrubland 1. Biotic soil crusts are not common and where they do occur, they tend to be poorly developed. Vegetation cover over the ground surface is 50 to 60 percent. Grazing pressures range from low to moderate. Big sagebrush (*Artemisia tridentata*) is the dominant scrub species, particularly on upper to medial positions on alluvial fans and stands average 2 to 3 ft in height. Relatively stunted black greasewood (*Sarcobatus vermiculatus*) often mixes with big sagebrush on distal ends of fans and terraces in valley bottoms and becomes co-dominant, but the range character of the understory remains the same. The understory is dominated by xeric grass species, primarily James galleta grass (*Hilaria jamesii*), blue grama (*Bouteloua gracilis*), New Mexico three-awn (*Aristida purpurea*), and bluestem wheatgrass (*Elymus smithii*). Cheatgrass (*Bromus tectorum*) is usually present but becomes more prevalent as disturbances increase, such as from livestock trampling

and off-road vehicle use. Common species within the association can include Indian ricegrass (*Oryzopsis hymenoides*), sand aster (*Chaetopappa ericoides*), purple hoary aster (*Machaeranthera canescens*), blunt tansy mustard (*Descurainea obtusa*), lacy tansy aster (*Machaeranthera pinnatifida*), woolly plantain (*Plantago patigonica*), rubber rabbitbrush (*Chrysothamnus nauseosus* var. *graveolens*), slender buckwheat (*Eriogonum microthecum* var. *simpsonii*), lambsquarter (*Chenopodium album*), yellow alyssum (*Alyssum alyssoides*), large petaled onion (*Allium macropetalum*), sand dropseed (*Sporobolus cryptandrus*), white hiddenflower (*Cryptantha crassisepala*), Russian thistle (*Salsola australis*), scarlet globemallow (*Sphaeralcea cocinnea*), short stemmed lupine (*Lupinus brevicaulis*), stickseed (*Lappula redowskii*), long-leaved phlox (*Phlox longifolia*), floccose gilia (*Gilia inconspicua*), Fendler's plains spring parsley (*Cymopterus acaulis* var. *fendleri*), and occasional winterfat (*Ceratoides lanata*).

4.1.3 Desert Shrubland 1 (DSHB 1)

Desert Shrubland 1 occurs sporadically in the eastern portion of the project area and becomes more common in the west (Figures 4.3 to 4.6, 4.10, 4.11, and 4.21). The community occurs at major arroyo crossings and adjacent alluvial terraces or distal end of alluvial fans that are subject to excessive erosion and deposition. Soils are generally a deep, grayish brown, clay loam alluvium lacking gravels and are excessively drained. Vegetation cover is 20 to 30 percent and biotic soil crusts are absent. The shrublands are characterized by black greasewood (*Sarcobatus vermiculatus*) stands 4 to 6 ft high. The understory varies considerably with mixes of Russian thistle (*Salsola* sp.), cheatgrass (*Bromus tectorum*), annual wheatgrass (*Eremopyrum triticeum*), alkali sacaton (*Sporobolus airoides*), six-weeks fescue (*Vulpia octaflora*), rubber rabbitbrush (*Chrysothamnus nauseosus* var. *graveolens*), cocklebur (*Xanthium strumarium*), redroot pigweed (*Amaranthus retroflexus*), cowpen daisy (*Verbesina encelioides*), Fremont lambsquarter (*Chenopodium fremontii*), Moquin's seepweed (*Suaeda moquinii*), and New Mexico saltbush (*Atriplex obovata*). At the Westwater Arroyo crossing, rubber rabbitbrush (*Chrysothamnus nauseosus* var. *graveolens*) shrubs up to 5 ft high are co-dominant with black greasewood (*Sarcobatus vermiculatus*) on the relatively wide floodplain.

4.1.4 Salt Desert Scrubland 1 (SDS 1)

Salt Desert Scrublands 1 and 2 both occur in low elevation, arid, desert habitats with saline soils derived from shale west of Piñon Mesa (Figures 4.3 to 4.7 and 4.21). The habitat occurs on slopes, hills, and mesas with soils primarily of colluvium but often mixed with residual, alluvial, and aeolian sediments depending on landscape position. Soils are pale brown to reddish brown silt loam and clay loam with a soft surface texture. Localized areas of angular sandstone gravels and/or rounded igneous gravels (quartzitic to chert from eroded conglomeritic lenses within the sandstone bedrock) are common. Vegetation cover is 20 to 30 percent and biotic soil crusts are poorly to moderately developed. Grazing pressures are low to moderate and water erosion is moderate to heavy. The height of the scrubs averages 12 to 16 inches. Diverse mixes of the following plant species dominate this community; shadscale (*Atriplex confertifolia*), winterfat (*Ceratoides lanata*), Bigelow sagebrush (*Artemisia bigelovii*), James galleta grass (*Hilaria jamesii*), Torrey's ephedra (*Ephedra torreyana*), Bigelow rabbitbrush (*Chrysothamnus nauseosus* var. *bigelovii*), New Mexico saltbush (*Atriplex obovata*), cheatgrass (*Bromus tectorum*), and annual wheatgrass (*Eremopyrum triticeum*). On moderate to steep north-facing slopes, slender wheatgrass (*Elymus trachycaulus*) is often one of the dominant species. Numerous other species are common, including corymb buckwheat (*Eriogonum corymbosum*), white-stemmed blazingstar (*Mentzelia albicaulis*), white hiddenflower (*Cryptantha crassisepala*), Indian ricegrass (*Oryzopsis hymenoides*), sand dropseed (*Sporobolus cryptandrus*), prickly pear (*Opuntia polyacantha*), scarlet

globemallow (*Sphaeralcea cocinnea*), alkali sacaton (*Sporobolus airoides*), sand verbena (*Abronia fragans*), New Mexico three-awn (*Aristida purpurea*), corrugated scorpionweed (*Phacelia crenulata* var. *corrugata*), Indian parsley (*Cymopterus bulbosus*), yellow beeplant (*Cleome lutea*), sand aster (*Chaetopappa ericoides*), Torrey ephedra (*Ephedra torreyana*), broom snakeweed (*Gutierrezia sarothrae*), blunt tansy mustard (*Descurainea obtusa*), Fendler's creeping fig (*Chamaesyce fendleri*), Russian thistle (*Salsola* spp.), mountain pepperweed (*Lepidium montanum*), Greene's rabbitbrush (*Chrysothamnus greenei*), scorpionweed (*Phacelia* sp.), Mormon tea (*Ephedra viridis*), bastard toadflax (*Comandra umbellata*), narrowleaf yucca (*Yucca* spp.), six-weeks fescue (*Vulpia octaflora*), scarlet globemallow (*Sphaeralcea cocinnea*), pale larkspur (*Delphinium andersonii* var. *scaposum*), woolly locoweed (*Astragalus mollissimus*), and Nuttall's pincushion cactus (*Coryphantha vivipara*). In slickrock or rocky slope areas within the community, species such as desert skunkbrush (*Rhus aromatica* ssp. *simpliicifolia*), single-leaf ash (*Fraxinus anomala*), Porter's muhly grass (*Muhlenbergia porteri*), and desert needlegrass (*Stipa speciosa*) are often common. This habitat is considered marginally suitable habitat for the rare Mesa Verde cactus (*Sclerocactus mesae-verdae*), although none were observed.

4.1.5 Salt Desert Scrubland 2 (SDS 2)

Salt Desert Scrubland 2 occurs in patches west of The Meadows on residual soils derived from weathered shale (Figures 4.3 to 4.5). Soils are a light brownish gray to gray clay loam and form a hard consolidated surface, although biotic crusts are either absent or only poorly developed. Localized areas of shale chip and angular sandstone gravels, as well as areas of rounded igneous gravels (from eroded conglomeritic lenses of sedimentary beds), are common to prevalent. Grazing pressures are low due to the sparse foliage and vegetation cover is a meager 1 to 10 percent. Height of the dominant scrubs rarely exceeds 12 inches. The dominant scrub species are Gardner saltbush (*Atriplex gardneri*), shadscale (*Atriplex confertifolia*), and alkali heath (*Frankenia jamesii*). James galleta grass (*Hilaria jamesii*) is the only dominant herbaceous species. Common species include mat saltbush (*Atriplex corrugata*), New Mexico saltbush (*Atriplex obovata*), halogenton (*Halogenton glomeratus*), corrugated scorpionweed (*Phacelia crenulata* var. *corrugata*), winterfat (*Ceratoides lanata*), gray Molly (*Kochia americana*), and broomrape (*Orobanche multiflora*). Other species commonly encountered consist of Indian parsley (*Cymopterus bulbosus*), annual Easter daisy (*Townsendia annua*), mountain pepperweed (*Lepidium montanum*), yellow beeplant (*Cleome lutea*), white-stemmed blazingstar (*Mentzelia albicaulis*), pale larkspur (*Delphinium andersonii* var. *scaposum*), Gordon's buckwheat (*Eriogonum gordonii*), Arizona rushpink (*Lygodesmia grandiflora* var. *arizonica*), dwarf false gilia (*Ipomopsis pumila*), funnel lily (*Androstephium breviflorum*), and Mohave brickellbush (*Brickellia oblongifolia* var. *linifolia*). This habitat is considered potentially suitable for the Mesa Verde cactus (*Sclerocactus mesae-verdae*), although none were observed.

4.1.6 Desert Grassland 1 (DG 1)

Desert grassland habitat occurs in areas west of Piñon Mesa on nearly level alluvial plains and fans (Figures 4.3 to 4.6 and 4.22). Soils are generally a pale yellowish brown silt loam or clay loam alluvium that lacks gravels and has poor drainage. Vegetation cover ranges from 10 to 30 percent and biotic soil crusts are absent. James galleta grass (*Hilaria jamesii*) and cheatgrass (*Bromus tectorum*) are usually co-dominant and account for 80 to 90 percent of the sparse plant cover. Alkali sacaton (*Sporobolus airoides*), annual wheatgrass (*Eremopyrum triticeum*), and six-weeks fescue (*Vulpia octaflora*) are subdominant. Common species include halogenton (*Halogenton glomeratus*), canaigre (*Rumex hymenosepalus*), Russian thistle (*Salsola australis*), blunt tansy mustard (*Descurainea obtusa*), and

occasional winterfat (*Ceratoides lanata*), wolfberry (*Lycium pallidum*), white-stemmed blazingstar (*Mentzelia albicaulis*), and New Mexico saltbush (*Atriplex obovata*). Four-wing saltbush (*Atriplex canescens*) or black greasewood (*Sarcobatus vermiculatus*) patches form in disturbed areas, including drainages, but the grass cover is similar. Areas of recent sediment deposition following major downpours are often barren or covered in annuals, such as the invasive Asiatic weeds of halogenton (*Halogenton glomeratus*) and bur buttercup (*Ranunculus testiculatus*).

4.1.7 Piñon Pine-Juniper Woodland 1 (PJ 1)

This woodland community occurs on high mesas, upper slopes, benches, and saddles blanketed with medium to large Quaternary/late Pliocene glacial outwash cobbles deposits, exclsuively at the eastern end of the project area (Figures 4.19 and 4.22). The soil matrix is a light reddish brown sandy loam colluvium and somewhat calcareous, particularly on mesa tops. Vegetation cover ranges from 30 to 40 percent and southern exposures prevail. Biotic crusts are generally lacking, but they are moderately formed in mesa top settings where the soil surface is more stabilized. Grazing pressures are low although evidence of historic to modern firewood/post cutting disturbances is prevalent throughout, increasing in proximity to roads. The overstory is dominated by Utah juniper trees (*Juniperus osteosperma*) with Colorado piñon pine (*Pinus edulis*) as subdominant. Piñon pine tree mortality from recent pine beetle (*Ips* spp.) infestations is 20 to 40 percent. These infestations ravaged P-J woodlands throughout the region, particularly during the prolonged 1998-2003 drought. The woodland is characterized primarily by medium-aged trees and the canopy averages 10 to 20 ft high. The understory is relatively open and dominant species include Mormon tea (*Ephedra viridis*), muttongrass (*Poa fendleriana*), broom snakeweed (*Gutierrezia sarothrae*), plains prickly pear (*Opuntia polyacantha*), New Mexico three-awn (*Aristida purpurea*), blue grama (*Bouteloua gracilis*), and James buckwheat (*Eriogonum jamesii*). Commonly occurring understory species consist of banana yucca (*Yucca baccata*), Ive's bitterweed (*Tetraneuris ivesiana*), Indian ricegrass (*Oryzopsis hymenoides*), New Mexico prickly pear (*Opuntia phaeacantha*), Whipple's cholla (*Cylindropuntia whipplei*), sand aster (*Chaetopappa ericoides*), linaria penstemon (*Penstemon linarioides*), needle and thread grass (*Stipa comata*), winged buckwheat (*Eriogonum alatum*), claretcup cactus (*Echinocereus triglochidiatus*), prickle lousewort (*Pedicularis centranthera*), plains prickly pear (*Opuntia macrorhiza*), spurred lupine (*Lupinus caudatus*), sego lily (*Calochortus* sp.), Fendler's spring parsley (*Cymopterus acaulis* var. *fendleri*), and Fendler's bladderpod (*Lesquerella fendleri*).

4.1.8 Piñon Pine-Juniper Woodland 2 (PJ 2)

The Piñon Pine-Juniper Woodland 2 (PJ 2) community occurs in similar landscape positions (medial to upper slopes and mesa tops) as seen in PJ 1, without glacial outwash cobble deposits, and occurs in large patches across the northern tier of the project (Figures 4.7, 4.8, 4.14, 4.16 to 4.19, and 4.23). The substrate is a reddish brown silt loam colluvium with localized areas of sub-angular to angular sandstone gravels and rocks. The soil and gravels are ultimately derived from San Jose and Nacimiento Formation sandstone and shale. Biotic crusts are common throughout the woodland and range from poorly developed to well-developed. Evidence of past to recent woodcutting is prolific, although grazing pressures are low. The overstory is characterized by equitable mixes of Utah juniper and Colorado piñon trees. An abundance of medium to old-aged trees characterizes these stands, although piñon pine mortality from recent pine beetle infestations is probably at 40 to 50 percent. This indicates that prior to the pine beetle infestations, Colorado piñon pine was probably dominant with Utah juniper as sub-dominant. Canopy height ranges from 12 to 25 ft high. Vegetation cover over the ground surface is

approximately 40 to 50 percent. The character of the understory is fairly open but denser than PJ 1. Understory dominants consist of antelope bitterbrush (*Purshia tridentata*), mountain mahogany (*Cercocarpus montanus*), Mormon tea (*Ephedra viridis*), banana yucca (*Yucca baccata*), Ive's bitterweed (*Tetraneuris ivesiana*), muttongrass (*Poa fendleriana*), plains prickly pear (*Opuntia macrorhiza*), and James buckwheat (*Eriogonum jamesii*). Common understory species include various mixes of bottlebrush squirreltail (*Elymus elymoides*), tansy mustard (*Descurainia pinnata*), Uinta groundsel (*Senecio multilobatus*), stemless bitterweed (*Tetraneuris acaulis*), prickle lousewort (*Pedicularis centranthera*), broom snakeweed (*Gutierrezia sarothrae*), Wright's clubflower (*Cordylanthus wrightii*), narrowleaf yucca (*Yucca* spp.), *Penstemon* spp., silver Easter daisy (*Townsendia incana*), scarlet gilia (*Ipomopsis aggregata*), various Cryptantha species (*Cryptantha* spp.), longbeak (*Streptanthella longirostris*), cheatgrass (*Bromus tectorum*), basin fleabane (*Erigeron pulcherrimus*), yellow Cryptantha (*Cryptantha flava*), Fendler rockcress (*Arabis holboellii* var. *fendleri*), common hyalineherb (*Hymenopappus filifolius*), Western wallflower (*Erysimum capitatum*), Utah serviceberry (*Amelanchier utahensis*), and New Mexico prickly pear (*Opuntia phaeacantha*). Occasional Gambel oak (*Quercus gambelii*) thickets occur in gullies and near the base of sandstone outcrops and ledges where soil moisture is presumably higher.

A slightly different version of this woodland community occurs on Piñon Mesa. The soils are shale residuum/colluvium derived from Ojo Alamao Sandstone parent materials. Rounded igneous gravels are common to abundant throughout the area and derived from eroded conglomeritic lenses. Soil texture is clay loam and silt loam and biotic soil crusts are poorly to well developed. Trees are notably stunted and tree height only reaches 6 to 10 ft high, although the large trunk diameter of most trees indicate they are mature to old age stands. The mix of Colorado piñon pine and Utah juniper is equitable although, interestingly, tree spacing is greater and probably contributed to the lack of piñon pine trees killed by the 1998-2003 pine beetle infestations. The harsh, saline soil conditions account for the stunted stature of the trees and vegetation cover is slightly less at 30 to 40 percent. The understory dominant shrubs are similar to PJ 2, as seen east of Piñon Mesa, including mountain mahogany (*Cercocarpus montanus*), antelope bitterbrush (*Purshia tridentata*), Utah serviceberry (*Amelanchier utahensis*), and Mormon tea (*Ephedra viridis*). Understory herbaceous species typically include broom snakeweed (*Gutierrezia sarothrae*), Indian ricegrass (*Oryzopsis hymenoides*), New Mexico three-awn (*Aristida purpurea*), Mohave brickellbush (*Brickellia oblongifolia* var. *linifolia*), Bailey's yucca (*Yucca baileyii*), Bigelow sagebrush (*Artemisia bigelovii*), prickly pear (*Opuntia* spp.), thrifty goldenweed (*Stenotus armeroides*), common horsebrush (*Tetradymia canescens*), and Torrey's ephedra (*Ephedra torreyana*). On north slopes, slender wheatgrass (*Elymus trachycaulus*) is usually a dominant understory species.

4.1.9 Piñon Pine-Juniper Woodland 3 (PJ 3)

This woodland community occurs on mesa slopes and benches where San Jose and/or Nacimiento Formation sandstone outcrops, ledges, talus, and cliffs dominate the landscape (Figures 4.14 and 4.16 to 4.19). Soils are generally a shallow, pale yellowish brown, sand to sandy loam residuum and residuum redeposited as colluvium. Angular to sub-angular sandstone gravels and rocks are common throughout the habitat. The mix of Utah juniper and Colorado piñon pine is equitable and, again, more open tree spacing probably contributes to the lack of trees killed by the 1998-2003 pine beetle infestations, which is only 10 percent or less. The trees are mature to old age and canopy height ranges from 12 to 20 ft. Biotic soils crusts are lacking due to prevalence of water erosion and relatively coarse texture of the soils. Vegetation cover is 30 to 40 percent where bedrock is absent. Utah serviceberry (*Amelanchier utahensis*) is the dominant understory shrub, followed by antelope bitterbrush (*Purshia tridentata*) and mountain

mahogany (*Cercocarpus montanus*). California brickellbush (*Brickellia californica*) is the dominant understory herbaceous species, followed by Indian ricegrass (*Oryzopsis hymenoides*), hairy goldenaster (*Heterotheca villosa*), muttongrass (*Poa fendleriana*), thrifty goldenweed (*Stenotus armeroides*), plains prickly pear (*Opuntia polyacantha*), and broom snakeweed (*Gutierrezia sarothrae*). Common species in the understory include tansy mustard (*Descurainia pinnata*), prince's plume (*Stanleya pinnata*), bottlebrush squirreltail (*Elymus elymoides*), New Mexico prickly pear (*Opuntia phaeacantha*), Gambel oak (*Quercus gambelii*), purple skeleton mustard (*Schoenocrambe linifolia*), purple hoary aster (*Machaeranthera canescens*), Bigelow sagebrush (*Artemisia bigelovii*), cliff fendlerbush (*Fendlera rupicola*), bladderopd (*Lesquerella rectipes*), bow-nut Cryptantha (*Cryptantha cinera* var *jamesii*), desert skunkbrush (*Rhus aromatica simpliicifolia*), tarragon (*Artemisia dracunculus*), and rock jasmine (*Androsace septentrionalis*). This habitat is considered potentially suitable for the San Juan false carrot (*Aletes sessiliflorus*), a somewhat rare to highly localized species affiliated with San Jose and Nacimiento Formation sandstone cliff/ledge habitat. This species was not found on the New Mexico side of the SJBEC, but was found on the Colorado side of the project (Loebig 2013).

4.1.10 Piñon Pine-Juniper Woodland 4 (PJ 4)

Piñon Pine-Juniper Woodland 4 (PJ 4) occurs on northern aspect, high elevation canyon slopes where evapotranspiration rates are lowest (Figures 4.18, 4.19, and 4.23). The soils are pale yellowish brown sand to sandy loam derived from sandstone residuum and colluvium. Tree crowns are somewhat spaced but the understory is very dense with a distinct chaparral shrub aspect, and very difficult to traverse. Grazing pressures are low and biotic crusts are poorly to moderately developed. Vegetation cover ranges from 50 to 70 percent. Colorado piñon pine is dominant with Utah juniper as the sub-dominant species. The age of the trees is young to mature. This demographic trend is likely the result of a greater fire frequency in chaparral zones given the relatively high fuel loads. The understory is dominated by dense mountain mahogany (*Cercocarpus montanus*) thickets 4 to 6 ft high. Subdominants include Utah serviceberry (*Amelanchier utahensis*) and in openings, antelope bitterbrush (*Purshia tridentata*). Dominant herbaceous species include muttongrass (*Poa fendleriana*), hairy goldenaster (*Heterotheca villosa*), James buckwheat (*Eriogonum jamesii*), and Indian ricegrass (*Oryzopsis hymenoides*). Common species can include Mormon tea (*Ephedra viridis*), pasture sage (*Artemisia ludoviciana*), thrifty goldenweed (*Stenotus armeroides*), bladderpod (*Lesquerella rectipes*), big sagebrush (*Artemisia tridentata*), scarlet gilia (*Ipomopsis aggregata*), with occasional mountain juniper (*Juniperus scopulorum*) trees. There is a conspicuous absence of branched apple (*Peraphyllum ramosissimum*), cliff fendlerbush (*Fendlera rupicola*), mountain snowberry (*Symphoricarpos oreophilus*), and Gambel oak (*Quercus gambelii*) as dominant and subdominant understory species when compared to the chaparral understories seen in similar woodlands at similar elevations on the Colorado side of the SJBEC (Loebig 2013). This could be attributable to a number of factors, such as slightly drier climate, shorter snowpack duration, and/or a more sandy soil texture.

4.1.11 Piñon Pine-Juniper Woodland 5 (PJ 5)

Piñon Pine-Juniper Woodland 5 (PJ 5) occurs throughout the project area on lower canyon slopes or near proximal ends of side-slope alluvial fans in valleys (Figures 4.7, 4.9 to 4.14, 4.16 to 4.18, and 4.24). In terms of soils, the community occurs in the long transition zones from colluvial to alluvial depositional environments. Soils are a pale yellowish brown sand to sandy loam of mixed colluvial/alluvial origin. The frequency of sub-angular sandstone gravels and rounded igneous gravels increases in upslope positions. Soils are relatively deep and well-drained. Grazing pressures are moderate to high. On down-

slope sides, the community transitions to Great Basin desert scrublands (GBDS 1 and 2). Vegetation cover is 40 to 50 percent and biotic soil crusts are absent due to loose, coarse-grained soils and prevalent slope washing and redeposition. In higher elevations, Colorado piñon pine tends to dominate with Utah juniper as the subdominant tree species. In lower elevations, Utah juniper becomes the dominant tree species. Tree height averages 14 to 25 ft. The understory is always dominated by big sagebrush (*Artemisia tridentata*) with antelope bitterbrush (*Purshia tridentata*) and broom snakeweed (*Gutierrezia sarothrae*) as marginal sub-dominants. With the exception of dense big sagebrush (*Artemisia tridentata*) stands, the undertory is sometimes nearly void of other plant species due to high alluvial deposition rates. Common understory species can include tansy mustard (*Descurainia pinnata*), pasture sage (*Artemisia ludoviciana*), Indian ricegrass (*Oryzopsis hymenoides*), New Mexico three-awn (*Aristida purpurea*), bottlebrush squirreltail (*Elymus elymoides*), dwarf rabbitbrush (*Chrysothamnus depressus*), cheatgrass (*Bromus tectorum*), stickseed (*Lappula redowskii*), wild tarragon (*Artemisia dracunculus*), banana yucca (*Yucca baccata*), Carruth's sagewort (*Artemisia carruthii*), redroot buckwheat (*Eriogonum racemosum*), long-flowered gilia (*Ipomopsis longiflora*), prickly gilia (*Leptodactylon pungens*), dwarf lupine (*Lupinus pusillus*), needle and thread grass (*Stipa comata*), claretcup cactus (*Echinocereus triglochidiatus*), sand aster (*Chaetopappa ericoides*), long-leaved phlox (*Phlox longifolia*), desert mountain phlox (*Phlox austromontana*), spreading fleabane (*Erigeron divergens*), large petaled onion (*Allium macropetalum*), many-flowered four o'clock (*Mirabilis multiflora*), Fendler creeping fig (*Chamaesyce fendleri*), and occasionally muttongrass (*Poa fendleriana*) or Junegrass (*Koeleria macrantha*). The presence of Greene's rabbitbrush (*Chrysothamnus greenei*) increases as elevation decreases. Southeast of Black Glade, the woodland understory takes on a more range like aspect with greater grass cover, similar to the species composition seen in GBDS 2. In Farmington Glade, the low hill crests are often covered with thick gravels and cobbles, with antelope bitterbrush (*Purshia tridentata*) replacing big sagebrush (*Artemisia tridentata*) as the dominant species and understory species become more similar to PJ 2, but with a notable lack of the mountain mahogany (*Cercocarpus montanus*) component.

4.1.12 Piñon Pine-Juniper Woodland 6 (PJ 6)

This woodland aspect occurs throughout much of the Piñon Mesa portion of the project and characterized by a sparse desert scrubland understory (Figures 4.7 to 4.10 and 4.24). It occurs on mesas, slopes, and valley sides. The soils are light gray, cream, to yellowish brown clay loam and silt loam derived from shale residuum and residuum redeposited as colluvium. Small, rounded, igneous gravels are common, with these originating from thin eroded conglomeritic lenses within the Ojo Alamo Sandstone. Vegetation cover is only 10 to 30 percent, while biotic soil crusts are moderately to well-developed. Grazing pressures are low. Utah juniper is the dominant tree species with Colorado piñon pine as sub-dominant. The trees are mature to old age, but are stunted and spaced due to the harsh, saline soil conditions, averaging only 6 to 12 ft high. The understory has a salt descrubland composition and dominants include various mixes of antelope bitterbrush (*Purshia tridentata*), Torrey's ephedra (*Ephedra torreyana*), Bigelow rabbitbrush (*Chrysothamnus nauseosus* var. *bigelovii*), corymb buckwheat (*Eriogonum corymbosum*), shadscale (*Atriplex confertifolia*), Utah serviceberry (*Amelanchier utahensis*), Bigelow sagebrush (*Artemisia bigelovii*), James galleta grass (*Hilaria jamesii*), Ive's bitterweed (*Tetraneuris ivesiana*), Mohave brickellbush (*Brickellia oblongifolia* var. *linifolia*), and broom snakeweed (*Gutierrezia sarothrae*). The understory encompasses a diverse array of plant species, such as sand aster (*Chaetopappa ericoides*), Bailey's yucca (*Yucca baileyi*), prickly gilia (*Leptodactylon pungens*), yellow cryptanth (*Cryptantha flava*), New Mexico three-awn (*Aristida purpurea*), common hyalineherb (*Hymenopappus filifolius*), thrifty goldenweed (*Stenotus armeroides*), fig prickly pear (*Opuntia erinicea*), Fendler's creeping fig (*Chamaesyce fendleri*), prince's plume (*Stanleya pinnata*), California brickellbush

(*Brickellia californica*), rough mule's ear (*Wyethia scabra*), skeleton-leaf blazingstar (*Mentzelia humilus*), oval-leaf buckwheat (*Eriogonum ovalfolium*), James buckwheat (*Eriogonum jamesii*), desert mountain phlox (*Phlox austromontana*), cushion milkwort (*Polygala subspinosa*), sharpleaf desert sandwort (*Arenaria fendleri* var. *aculeata*), slender buckwheat (*Eriogonum microthecum* var. *simpsonii*), false buffalo grass (*Munroa squarrosa*), stemless bitterweed (*Tetraneuris acaulis*), Whipples cholla (*Cylindropuntia whipplei*), yellow-hair cryptanth (*Cryptantha fulvocanescens*), longhorn milkweed (*Asclepias macrotis*), slender wheatgrass (*Elymus trachycaulus*), San Juan bahia (*Bahia oblongifoloia*), hispidcress (*Lepidium lasiocarpum*), narrow-mouth penstemon (*Penstemon breviculus*), taperleaf penstemon (*Penstemon angustifolius*), Ive's scorpionweed (*Phacelia ivesiana*), short-stemmed lupine (*Lupinus brevicaulis*), dwarf lupine (*Lupinus pusillus*), and several unidentified composites (*Asteraceae*).

4.1.13 Piñon Pine-Juniper Woodland 7 (PJ 7)

The Piñon Pine-Juniper Woodland 7 (PJ 7) community occurs in patches from east of the La Plata River Valley to the south end of the Farmington Glade portion of the project area (Figures 4.9, 4.10, and 4.12). The woodland occurs on Nacimiento Formation shale residual soils on breaks and ridge crests. Soils are cream to light gray clay to fine sandy loam residuum and compact with well-developed biotic crusts. Vegetation cover is only 10 to 20 percent and grazing pressures are low. Like PJ 6, the trees are stunted and well spaced from harsh soil conditions and range from 8 to 12 ft high, although the trees are mature to old age. Bigelow sagebrush (*Artemisia bigelovii*) is the dominant understory scrub, with James galleta grass (*Hilaria jamesii*), Bigelow rabbitbrush (*Chrysothamnus nauseosus* var. *bigelovii*), Torrey's ephedra (*Ephedra torreyana*), and corymb buckwheat (*Eriogonum corymbosum*) as sub-dominants. Common understory species are comprised of prickly gilia (*Leptodactylon pungens*), Indian ricegrass (*Oryzopsis hymenoides*), yellow cryptanth (*Cryptantha flava*), yellow-hair cryptanth (*Cryptantha fulvocanescens*), oval-leaf buckwheat (*Eriogonum ovalfolium*), common hyalineherb (*Hymenopappus filifolius*), skelton blazingstar (*Mentzelia humilus*), prince's plume (*Stanleya pinnata*), Bailey's yucca (*Yucca baileyi*), narrow-mouth penstemon (*Penstemon breviculus*), painted milkvetch (*Astragalus ceramicus*), silver Easter daisy (*Townsendia incana*), Hood's phlox (*Phlox hoodii*), Fendler's creeping fig (*Chamaesyce fendleri*), Indian potato (*Pediomelum megalanthum*), San Juan bahia (*Bahia oblongifoloia*), Hayden's gilia (*Gilia haydenii*), Bolack's sand verbena (*Abronia bolackii*), gumweed aster (*Machaeranthera grindeloides*), thrifty goldenweed (*Stenotus armeroides*), and bow-nut Cryptantha (*Cryptantha cinera* var *jamesii*). While somewhat similar to PJ 6 with a salt desert scrubland understory but with a distinct encrusted Nacimiento Formation shale residuum soil, this association is considered potentially suitable habitat for the Aztec gilia (*Gilia formosa*) and Brack's hardwall cactus (*Sclerocactus cloveriae* var. *brackii*). Both of these rare plant species are BLM Special Management Species that were found in the project area.

4.1.14 Wetland Fringe (WF)

Wetland, or hydrophytic, vegetation was found only on the lower banks of the La Plata River channel (Figure 4.10). Due to the drought conditions of 2012 and irrigation practices, the channel of the river was dry during the late fall survey. Soils are a light brown fine sandy loam alluvium and vegetation cover ranges from 70 to 100 percent. The association is dominated almost exclusively by American three-square (*Scirpus pungens*) and redtop bentgrass (*Agrostis gigantea*). The upper banks include many species that typically occur outside but near the perimeter of wetlands, including Canadian goldenrod (*Solidago canadensis*), creeping wild rye (*Elymus triticoides*), inland saltgrass (*Disticlis spicata*), meadow muhly (*Muhlenbergia asperifolia*) meadow fescue (*Festuca pratensis*), Canada thistle (*Cirsium*

arvense), cocklebur (*Xanthium strumarium*), witchgrass (*Panicum capillare*), foxtail barley (*Hordeum jubatum*), and Japan brome (*Bromus japonicus*). Occasional dense stands of common reedgrass (*Phragmites australis*) occur along the banks as well.

4.1.15 Riparian Shrubland 1 (RS 1)

This community occurs only on the wide La Plata River floodplain west of the river channel and associated riparian woodland (Figure 4.10). Soils are a light tan sand to sandy loam alluvium and as with all of the riparian zone communities, no biotic soil crusts have formed. Grazing pressures are low to moderate. The community is characterized by nearly impenetrable thickets of the invasive tamarisk (*Tamarix ramosissima*) with stands averaging 8 to 12 ft high. Tamarisk is an exotic phreatophyte, capable of lowering the water table. The species has dramatically altered riparian ecosystems throughout the northern Southwest and displaced the typical cottonwood and willow communities that previously characterized these riparian zones. The understory is dominated by alkali sacaton (*Sporobolus airoides*), flax-leaved rabbitbrush (*Chrysothamnus linifolius*), and four-wing saltbush (*Atriplex canescens*). Common species consist primarily of weeds, particularly erect pigweed (*Amaranthus retroflexus*), summer cypress (*Kochia scoparia*), cocklebur (*Xanthium strumarium*), Fremont lambsquarter (*Chenopodium fremontii*), Canadian thistle (*Cirsium arvense*), lambsquarter (*Chenopodium* spp.), mountain pepperweed (*Lepidium montanum*), and cowpen daisy (*Verbesina encelioides*). Weeds proliferate in the understory due to the loose nature of the soil and periodic scouring, or disturbance, from floodwater events and livestock grazing as most of the valley bottom is on private agricultural lands.

4.1.16 Riparian Woodland 1 (RW 1)

Riparian Woodland 1 is present only at the Cox Canyon crossing and occurs on a low terrace adjacent to the dry wash channel (Figure 4.19). The soils are a loose pale brown fine to medium-grained sand alluvium and the soil is deep and well-drained. The riparian woodland zone at Cox Canyon (RW 1) is a much more xeric and open aspect when compared to the La Plata River crossing (RW 2). Vegetation cover is only 50 to 60 percent and valley cottonwood tree (*Populus deltoides* ssp *wizlizenii*) height is 40 to 50 ft, although they are widely spaced. The shrub and herbaceous layers are relatively sparse and subject to heavy livestock grazing. The understory is characterized by big sagebrush (*Artemisia tridentata*), silver sagebrush (*Artemisia cana*), rubber rabbitbrush (*Chrysothamnus nauseosus* var. *graveolens*), sand dropseed (*Sporobolus cryptandrus*), needle and thread grass (*Stipa comata*), four-wing saltbush (*Atriplex canescens*), cheatgrass (*Bromus tectorum*), and Russian thistle (*Salsola australis*). Common species include cocklebur (*Xanthium strumarium*), Western ragweed (*Ambrosia psilotachya*), Jim Hill mustard (*Sisymbrium altissimum*), wolfberry (*Lycium pallidum*), and Indian ricegrass (*Oryzopsis hymenoides*).

4.1.17 Riparian Woodland 2 (RW 2)

The Riparian Woodland 2 community is located only at the La Plata River crossing and occurs on the floodplain in close proximity to the river channel (Figure 4.10). Soils are a deep, light tan fine sand alluvium and vegetation cover is 100 percent with significant overlaps between tree, shrub, and understory layers. The canopy is 30 to 40 ft high and the lack of old growth trees suggests periodic flooding maintains younger successional growth. The canopy layer is occupied by box elder (*Negundo aceroides*), Russian olive (*Elaeagnus angustifolia*), and scattered valley cottonwood (*Populus deltoides* ssp *wizlizenii*) saplings and trees. The shrub layer is characterized by dense tamarisk (*Tamarix ramosissima*), sandbar willow (*Salix exigua*), New Mexico olive (*Forestiera pubescens*), and flax-leaved

rabbitbrush (*Chrysothamnus linifolius*). The primary herbaceous species include several grass species, particularly inland saltgrass (*Disticlis spicata*) and meadow muhly (*Muhlenbergia asperifolia*), in addition to sprawling growth of Western virgin's bower (*Clematis ligusticifolia*) and an unidentified mustard.

4.2 Wildlife

Mammal species observed in the vicinity of the project area, or inferred from evidence (e.g., tracks, scrapes, feces, or vocalizations), consist of pronghorn (*Antilocapra Americana*; Figure 4.25), mule deer (*Odocoileus hemionus*), Rocky Mountain elk (*Cervus elaphus* ssp. *nelsoni*), coyote (*Canis latrans*), common gray fox (*Urocyon cinereoargenteus*), mountain lion (*Felis concolor*), bobcat (*Lynx rufus*), American badger (*Taxidea taxus*), common raccoon (*Procyon lotor*), desert cottontail (*Sylvilagus audubonii*), black-tailed jackrabbit (*Lepus californicus*), white-tailed antelope squirrel (*Ammospermophilus leucurus*), kangaroo rat (*Dipodomys spp.*), rock squirrel (*Spermophilus variegatus*), and Mexican woodrat (*Neotoma mexicana*). There are nine Gunnison's prairie dog (*Cynomys gunnisoni*) colonies recorded by the BLMFFO within or adjacent to the project area. Five additional prairie dog complexes were identified within the project area during the 2012 field investigations. Pronghorn were a regular occurance within the desert scrubland and desert grassland communities at the far western portion of the project area. As the terrain transitions to foothills and rocky canyons near Structure 61, the habitat becomes more conducive to mule deer and elk. Sets of adult mountain lion, American badger, and common raccoon tracks were observed in the La Plata River corridor. Kangaroo rat burrows within raised mounds 1 to 2 ft high were identified along an access road at BPI 8 in dunal deposits. Several other mammal species likely inhabit the project area, particularly rodents, but simply were not observed during the daytime surveys.

Reptiles encountered during the survey include the Western whiptail (*Cnemidophorus tigris*), plateau striped whiptail (*Cnemidophorus velox*), lesser earless lizard (*Holbrookia maculata*), short-horned lizard (*Phrynosoma hernandesi*), collared lizard (*Crotophytus collaris*), prairie lizard (*Sceloporous undulatus*), sagebrush lizard (*Sceloporus graciosus*), Western rattlesnake (*Crotalus viridis*), gopher snake (*Pituophis melanoleucus*; often referred to as a bullsnake in the region), and coachwhip snake (*Mastico flagellum*). No amphibians were observed within the project area.

Fifty-eight bird species were identified within the project area (Table 4.4). The majority of birds were found in woodland habitats. Most species identified are year-round residents, as most seasonal migrants moved south prior to the field survey. Surveying during the fall season limited the number of species observed (30), and did not allow for detection of any breeding bird activity in the area. Only a few stick nests and whitewash along cliffs were observed during the fall survey by URS. Another 28 bird species were observed incidentally during the spring 2013 rare plant surveys. Two active Fuertes red-tailed hawk (*Buteo jamaicensis fuertesi*) nests were identified in the spring of 2013 in steel transmission line towers that the SJBEC parallels on the southwest side of the project (BPIs 44 and 52). The most frequently encountered species included the common raven (*Corvus corax*), Western scrub jay (*Aphelocoma californica*), black-capped chickadee (*Poecile atricapilla*), horned larks (*Eremophila alpestris*), dark-eyed junco (*Junco hyemalis oreganus*), and mountain bluebird (*Sialia currucoides*). Horned larks (*Eremophila alpestris*), black-throated sparrow (*Amphispiza bilineata*; Figure 4.25), and rock wrens (*Salpinctes obsoletus*) were common in the desert scrubland and grassland communities west of Piñon Mesa, with the latter

Table 4.4 Bird Species Observed in the Project Area

Common Name	Scientific Name
American crow	*Corvus brachyrhynchos*
American goldfinch	*Carduelis lawrencei*
American kestral	*Falco sparverius*
American robin	*Turdus migratorius*
Ash-throated flycatcher	*Myiarchus cinerascens*
Black-billed magpie	*Pica hudsonia*
Black-capped chickadee	*Poecile atricapilla*
Black-headed grosbeak	*Pheucticus melanocephalus*
Black-throated sparrow	*Amphispiza bilineata*
Black-chinned hummingbird	*Archilochus alexandri*
Bushtit	*Psaltriparus minimus*
Canada goose	*Branta canadensis*
Canyon wren	*Catherpes mexicanus*
Chipping sparrow	*Spizella passerina*
Cliff swallow	*Petrochelidon pyrrhonota*
Common nighthawk	*Chordeiles minor*
Common poorwill	*Phalaenoptilus nuttaillii*
Common raven	*Corvus corax*
Dark-eyed junco	*Junco hyemalis oreganus*
Eurasian collared dove	*Streptopelia decaocto*
Golden eagle	*Aquila chrysaetos*
Gray flycatcher	*Empidonax wrightii*
Gray vireo	*Vireo gilvus*
Green-tailed towhee	*Pipilo chlorurus*
Hairy woodpecker	*Picoides villosus*
Horned lark	*Eremophila alpestris*
House finch	*Carpodacus mexicanus*
House wren	*Troglodytes aedon*
Juniper titmouse	*Parus inornatus*
Lesser goldfinch	*Carduelis tristis*
Loggerhead shrike	*Lanius ludovicianus*
Mountain bluebird	*Sialia currucoides*
Mourning dove	*Zenaida macroura*
Northern flicker	*Colaptes auratus*
Northern mockingbird	*Turdus migratorius*
Pine siskin	*Carduelis pinus*
Pinyon jay	*Gymnorhinus cyanocephalus*
Prairie falcon	*Falco mexicanus*
Pygmy nuthatch	*Sitta pygmaea*
Red-naped sapsucker	*Sphyrapicus nuchalis*
Red-tailed hawk, Fuertes race	*Buteo jamaicensis fuertesi*

Table 4.4 Bird Species Observed in the Project Area (Continued)

Rock dove	*Columba livia*
Rock wren	*Salpinctes obsoletus*
Say's phoebe	*Sayornis saya*
Sharp-shinned hawk	*Accipiter striatus*
Spotted towhee	*Pipilo maculatus*
Stellar's jay	*Cyanocitta stelleri*
Turkey vulture	*Cathartes aura*
Violet-green swallow	*Tachycineta thalassina*
Western bluebird	*Sialia mexicana*
Western kingbird	*Tyrannus verticalis*
Western meadowlark	*Strunella neglecta*
Western scrub jay	*Aphelocoma californica*
Western wood-pewee	*Contopus sordidulus*
White-breasted nuthatch	*Sitta carolinensis*
White-crowned sparrow	*Zonotrichia leucophrys*
White-throated swift	*Aeronautes saxatalis*
Yellow-rumped warbler	*Dendroica coronata*

occurring on rock outcrops and talus throughout the project. The Western scrub jay (*Aphelocoma californica*), pinyon jay (*Gymnorhinus cyanocephalus*), white-breasted nuthatch (*Sitta carolinensis*), mourning dove (*Zenaida macroura*), mountain bluebird (*Sialia currucoides*), chipping sparrow (*Spizella passerina*), bushtit (*Psaltriparus minimus*), juniper titmouse (*Parus inornatus*), black-capped chickadee (*Poecile atricapilla*), black-chinned hummingbird (*Archilochus alexandri*), and yellow-rumped warbler (*Dendroica coronata*) primarily occupied the woodland communities. The loggerhead shrike (*Lanius ludovicianus*), listed as sensitive by both the NMDGF and USFWS, was observed on several occasions within desert shrubland communities and were apparently breeding in those habitats during the spring of 2013 survey. The gray flycatcher (*Empidonax wrightii*), juniper titmouse (*Parus inornatus*), pinyon jay (*Gymnorhinus cyanocephalus*), white-throated swift (*Aeronautes saxatalis*), black-chinned hummingbird (*Archilochus alexandri*), golden eagle (*Aquila chrysaetos*), and prairie falcon (*Falco mexicanus*) were all observed in the project area and are listed as Priority Migratory Bird Secies with the Partners in Flight Bird Conservation Plan (PFBCP) and/or the USFWS Birds of Conservation Concern.

Raptors detected during the survey included the red-tailed hawk (*Buteo jamaicensis*), sharp-shinned hawk (*Accipiter striatus*), prairie falcon (*Falco mexicanus*), and American kestrel (*Falco sparverius*). The sharp-shinned hawk was identified perched in a juniper tree just south of State Highway 574 near Structure 153. The prairie falcon (*Falco mexicanus*), listed as a priority Migratory Bird Species with the USFWS Birds of Conservation Concern, was observed flying overhead in an area of rock outcroppings and cliff bands near Structure 196. Nesting habitat for this species is present within the area though no nests were detected. Nest detection is very limited outside the breeding season for this species, as no nest structure is typically built. Potential cliff nesting habitat is present along the proposed project area within rock outcroppings and larger bluffs, increasing in presence towards the east.

Figure 4.25 Pronghorn (Top) and Black-throated Sparrow (Bottom) in SDS 1 Habitat of the Project Area

BLM records indicate two active raptor nests within 1/3 mile of San Juan County Road (SJCR) 2300, including breeding pairs of prairie falcon and golden eagle (Figure 4.18). This road currently experiences regular vehicular traffic from oil and gas activities in the area. A third nest, also attributed to golden eagles, is located south and within 1/3 mile of the project area near Structure 235 (Figure 4.18). The adults at another active golden eagle nest north of Kirtland apprently moved to a new nesting location 1.5 miles south of Structure 58 of the SJBEC in the spring of 2013 (John Kendall, personal communication, 05/02/13).

4.3 Biological Points of Interest

A total of 43 BPIs were observed and documented during the biological field surveys. The BPIs include noxious weed infestations, water/wetland crossings, potentially suitable habitat for protected rare plants, and riparian forest habitat, as well as other areas with MBTA concerns within or immediately adjacent to the proposed easement. A brief description of each BPI is provided in Table 4.5 (Figures 4.26 to 4.36).

4.3.1 Noxious and Invasive Weeds

Four noxious weed infestations were identified, both of which are Russian knapweed outbreaks (BPIs 42, 43, 49, and 50). Two of these outbreaks occur in the La Plata River Valley and two occur in Farmington Glade. The spread of these noxious weeds can be minimized by spraying the infestations prior to flowering and construction disturbance, in addition to post-construction monitoring measures.

4.3.2 Wetlands and Riparian Areas

BPI 37 is the only hydrophytic vegetation within the project, other than an irrigation canal on the west side of the La Plata River Valley, and is a wetland fringe community (WF 1) dominated by American three-square sedge and bentgrass along the lower banks of the intermittent La Plata River channel. Riparian shrublands and woodlands only occur on the La Plata River floodplain and on a low terrace in Cox Canyon. Since the La Plata River, La Plata River floodplain, and the Cox Canyon valley bottom will be spanned by the transmission line, these riparian and wetland areas will not be affected and no wetland delineations are recommended.

4.3.3 Migratory Birds

With the exception of the Eurasian collared dove, an introduced species, the remaining 57 bird species observed during field surveys are protected under the MBTA, and many more bird species likely occur in the area. Nesting detection was not possible due to surveys being conducted outside the breeding season. Two active Fuertes red-tailed hawk (*Buteo jamaicensis fuertesi*) nests were identified in the spring of 2013 in steel transmission line towers (BPIs 44 and 52). A total of 16 BPIs (BPIs 1, 4, 5, 7, 9-14, 18-20, 44, 48, and 52) address potential MBTA concerns.

4.3.4 Rare Plant Locations

BPIs 29 to 35 correspond with SDS 2, which is good quality Mesa Verde cactus (*Schlerocactus mesae-verdae*) habitat of residual Fruitland soils. These areas were surveyed in April and May of 2013 when the species is flowering and most detectable, although no Mesa Verde cacti were observed during these intensive surveys. BPIs 36, 38, 39, and 40 correspond with the PJ 7 plant community and are considered good qualitiy habitat for the Aztec gilia and Brack hardwall cactus. As with the Mesa Verde cactus, the optimal survey period for the Aztec gilia (*Aliciella formosa*) and Brack hardwall cactus (*Sclerocactus clovieriae ssp. brackii*) is April and May when they are flowering and most readily recognized. These

Table 4.5 Biological Points of Interest (BPI)

BPI#	Centerpoint UTM Coordinates (Zone 13, NAD 83)	Description
BPI 1	N 4078912, E 728151	Two stick nests at the top of a rock ledge along the cliff band (Figures 2.2 and 4.3); owl pellets were found on the ground below the nest structures; a great horned owl was noted in the area earlier in the year
BPI 2	N 4081081, E 728704	Large burrow, likely occupied by a canid or badger (Figures 2.3 and 4.4), located near a Gunnison's prairie dog colony
BPI 3	N 4080620, E 728865	A prairie dog burrow that has been dug out and enlarged and may be serving as the den for a larger mammal (Figures 2.3 and 4.4)
BPI 4	N 4081308, E 730895	Whitewash evident on small ledge which may indicate a nest or popular roost (Figures 2.3, 2.4, 4.4, and 4.5)
BPI 5	N 4080793, E 731061	Loggerhead shrike observed in desert scrubland. This species is listed as sensitive with the NMDGF (Figures 2.3 and 4.4)
BPI 6	N 4081275, E 734910	Water tank with a spout at ground level (Figures 2.5 and 4.6); the feature is fenced with barbed wire. Water was present at the time of the survey
BPI 7	N 4081501, E 735323	Whitewash evident on cliffs which may indicate a nest or popular roost (Figures 2.5 and 4.6)
BPI 8	N 4078089, E 733323	Numerous burrows dug in raised dirt mounds approximately 1-2 feet high (Figures 2.4 and 4.5); most likely kangaroo rat burrows
BPI 9	N 4081568, E 738696	Cluster of sticks located in the cliffs to the north (Figures 2.6 and 4.7); most likely a nest structure
BPI 10	N 4081585, E 743736	Cluster of sticks located in the cliffs to the south (Figures 2.7 and 4.8); most likely a nest structure.
BPI 11	N 4082040, E 747439	An old black-billed magpie nest is located in a pinon tree (Figures 2.8 and 4.9); the structure does not appear to have been maintained in the last year
BPI 12	N 4082000, E 747509	A black-billed magpie nest falling apart and located in a pinon tree near the nest at BPI 16 (Figures 2.8 and 4.9)

Table 4.5 Biological Points of Interest (Continued)

BPI 13	N 4082143, E 747939	Possible cavity nest n a cottonwood snag within the La Plata River riparian corridor (Figures 2.8, 2.9, 4.9, and 4.10)
BPI 14	N 4082042, E 748045	Dense tamarisk stands within the La Plata River floodplain with cottonwood overstory (RW2), along the west side of the river (Figures 2.9 and 4.10); this habitat may provide suitable habitat for southwestern willow flycatcher and yellow-billed cuckoo
BPI 15	N 4082092, E 748158	Large burrow on the bank above the La Plata River within the GBDS 2 habitat (Figures 2.9 and 4.10); the opening is 1-1.5 feet wide; tracks indicate a badger burrow
BPI 16	N 4086115, E 758255	Man-made waterer supplied by a groundwater well (Figures 2.12 and 4.13); no water present at the time of observation.
BPI 17	N 4087923, E 759459	Gunnison's Prairie Dog colony within GBDS 2 habitat; 36.67 acres (Figures 2.12 and 4.13)
BPI 18	N 4098321, E 241280	Stick nest structure in a cove with whitewash at the base (Figures 2.18 and 4.19)
BPI 19	N 4098280, E 241363	Whitewash evident along rock band at the base of a small cove to the east (Figures 2.18 and 4.19); may indicate a nest or popular roost.
BPI 20	N 4098280, E 241363	Mud nests of probable cliff swallows under a rock ledge (Figures 2.18 and 4.19)
BPI 21	N 4082007, E 747741	Active Gunnison's prairie dog colony located in a fallow agricultural field; 40.84 acres (Figures 2.8, 2.9, 4.9, and 4.10)
BPI 22	N 4081256, E 730366	Active prairie dog colony within SDS 1 habitat; 448.11 acres (Figures 2.3. 2.4, 4.4, and 4.5); potential burrowing owl and black-footed ferret habitat
BPI 23	N 4080746, E 729079	Active Gunnison's prairie dog colony in desert grassland; 209.44 acres (Figures 2.3 and 4.4); it extends approximately 0.65 miles across the proposed project area and extends on either side of the project area; an individual prairie dog and fresh scat was observed; potential burrowing owl and black-footed ferret habitat.

Table 4.5 Biological Points of Interest (Continued)

BPI 24	N 4081352, E 731241	Active prairie dog colony within SDS 1 habitat; 5.22 acres (Figures 2.3, 2.4, 4.4, and 4.5); area to the south with smaller burrows, likely ground squirrel; potential burrowing owl and black-footed ferret habitat
BPI 25	N 4078117, E 732242	Man-made stock pond in corral (Figures 2.4 and 4.5); it appears to be supplied by overland flow and supplemented with hauled water; water was present at the time of observation
BPI 26	N 4090406, E 761312	Recently created water catchment (Figures 2.13 and 4.14); no water present but surface cracks in the very bottom indicate that it recently held water
BPI 27	N 4094077, E 764163	Man-made water catchment with dam to collect overland flow (Figure s 2.14 and 4.15)
BPI 28	N 4098733, E 233139	Man-made water catchment with dam to collect overland flow (Figure s 2.16 and 4.17)
BPI 29	N 4075578, E 725714	Potential suitable Mesa Verde cactus habitat, corresponding with SDS 2 plant community (Figures 2.2 and 4.3)
BPI 30	N 4075767, E 726682	Potential suitable Mesa Verde cactus habitat, corresponding with SDS 2 plant community (Figures 2.2, 2.3, 4.3, and 4.29)
BPI 31	N 4078149, E 728053	Potential suitable Mesa Verde cactus habitat, corresponding with SDS 2 plant community (Figures 2.2 and 4.3)
BPI 32	Number voided	
BPI 33	N 4079361, E 728067	Potential suitable Mesa Verde cactus habitat, corresponding with Mixed SDS 1 and 2 habitat (Figures 2.3 and 4.4)
BPI 34	N 4081245, E 729680	Potential suitable Mesa Verde cactus habitat, corresponding with SDS 2 plant community (Figures 2.3 and 4.4)
BPI 35	N 4081227, E 730729	Potential suitable Mesa Verde cactus habitat, corresponding with SDS 2 plant community (Figures Figures 2.3, 2.4, 4.4, and 4.5)

Table 4.5 Biological Points of Interest (Continued)

BPI 36	N 4081715, E 746507	Area of interfingered Nacimiento soils, potential Aztec gilia and Brack hardwall cactus habitat (Figures 2.8 and 4.9)
BPI 37	N 4082013, E 748088	Wetland fringe vegetation along lower banks of dry La Plata River channel; WF 1 plant community (Figures 2.9 and 4.10)
BPI 38	N 4081772, E 749280	Nacimiento soil habitat (PJ 7 plant community); potential Aztec gilia and Brack hardwall cactus habitat (Figures 2.9 and 4.10)
BPI 39	N 4082358, E 752937	Nacimiento soil habitat (PJ 7 plant community); potential Aztec gilia and Brack hardwall cactus habitat (Figures 2.10 and 4.11)
BPI 40	N 4086473, E 758439	Nacimiento soil habitat (PJ 7 plant community); potential Aztec gilia and Brack hardwall cactus habitat (Figures 2.12 and 4.13)
BPI 41	N 4088682, E 760246	One Clover's sclerocactus in GBDS 2 habitat of Farmington Glade, a former species of concern (Figures 2.13 and 4.14)
BPI 42	N 4082105, E 747589	Russian knapweed infestation of 300+ plants along canal on west side of the La Plata River Valley (Figures 2.9 and 4.10)
BPI 43	N 4082040, E 748094	Russian knapweed infestation on low terrace just east of La Plata River channel, also 100s of plants (Figures 2.9 and 4.10)
BPI 44	N 4079793, E 728095	Active red-tailed hawk nest (Fuertes race) in existing steel tower #204, near proposed turning structure #25 (Figures 2.3, 4.4, and 4.26). Male observed bringing female a Western whiptail at the nest site.
BPI 45	N 4077784, E 728195	Two Naturita milkvetch plants (confirmed ID with pods and flower) in east buffer of ROW in slickrock outcropping; corymb buckwneat, desert skunkbrush/sumac, and Bigelow sagebrush association on light reddish brown fine sand residuum (Figures 2.2, 4.3, and 4.27)

Table 4.5 Biological Points of Interest (Continued)

BPI 46	N 4081028, E 731822	Two probable but unconfirmed (no flowers or pods) Cottam's milkvetch plants on slickrock; in shadscale, Mormon tea, and Bigelow sagebrush association on light reddish brown gravelly sandy loam residuum (Figures 2.4 and 4.5)
BPI 47	N 4081089, E 731667	Six probable but unconfirmed (no flowers or pods) Cottam's milkvetch plants in slick rock habitat; in shadscale, Mormon tea, Bigelow sagebrush, and Bailey's yucca association on light reddish brown gravelly loam residuum (Figures 2.4 and 4.5)
BPI 48	N 4098307, E 241363 (Zone 13)	Active cliff swallow colony under large overhang of south-facing cliff, just south of project area in unnamed side canyon of Cox Canyon; 40+ mud nests (Figures 2.18, 4.19, and 4.28)
BPI 49	N 4094196, E 764127	Invasive weed infestation of 20+ Russian knapweed plants on north side of two-track proposed access (Figures 2.14 and 4.15)
BPI 50	N 4088387, E 759861	Invasive weed infestation of 100+ Russian knapweed plants on west side of bladed dirt road just north of intersection with NM 574 (Figures 2.12, 4.13, and 4.14)
BPI 51	N 4086340, E 758725	250+ Aztec gilia plants and at least 4 Brack's hardwall cacti; out of project but found while accessing to survey area, reported for conservation purposes only; Nacimiento soil habitat in P-J, Bigelow rabbitbrush, galleta, yellow-hair Cryptantha, and bitterweed on cream to gray sandy loam residuum (Figures 2.12 and 4.13)
BPI 52	N 4081843, E 749084	Active red-tailed hawk nest (Fuertes race) in existing steel tower #140; female observed on nest with male circling above and calling out with down-slurred scream (Figures 2.9, 4.10, and 4.29)
BPI 53	N 4081807, E 749298	Nine Aztec gilia and 5 Brack's hardwall cacti; interface of Ojo Alamo Sandstone and Nacimiento Formation soils; P-J, Bigelow rabbitbrush, and yellow Cryptantha association on gray sandy loam residuum with abundant rounded igneous gravels (Figures 2.9, 4.10, 4.30, and 4.32..)

Table 4.5 Biological Points of Interest (Continued)

BPI 54	N 4081783, E 749402	35+ Aztec gilia plants upslope from BPI 53; interface of Ojo Alamo Sandstone and Nacimiento Formation soils; P-J, antelope bitterbrush, Bigelow rabbitbrush, and Bailey's yucca association on gray sandy loam residuum with some rounded igneous gravels (Figures 2.9, 4.10, and 4.31)
BPI 55	N 4081782, E 748941	20+ Brack's hardwall cactus plus 1 live Aztec gilia and 1 dead Aztec gilia plants; interface of Ojo Alamo Sandstone and Nacimiento Formation soils; P-J, Bigelow rabbitbrush, Torrey's ephedra, and yellow Cryptantha association on gray sandy loam residuum with some rounded igneous gravels (Figures 2.9 and 4.10)
BPI 56	N 4081840, E 749111	Small concentration of 8 Brack's hardwall cacti just NE 30 m from red-tailed hawk nest at BPI 52; interface of Ojo Alamo Sandstone and Nacimiento Formation soils; P-J and Bigelow rabbitbrush association on gray silt loam residuum (Figures 2.9, 4.10, 4.32, and 4.33)
BPI 57	N 4081804, E 749447	3 Aztec gilia plants; interface of Ojo Alamo Sandstone and Nacimiento Formation soils; P-J, bitterbrush, and galleta association on gray sandy loam residuum (Figures 2.9 and 4.10)
BPI 58	N 4082405, E 752963	5 Brack's hardwall cacti in 8 m diameter area; ; Nacimiento Formation soils; UT juniper woodland with Bigelow sagebrush, Torrey ephedra, and galleta on gray silt loam residuum (Figures 2.10 and 4.11)
BPI 59	N 4082459, E 752973	25+ Aztec gilia plants, most in 10 m diameter area on Nacimiento soils; P-J, corymb buckwheat, Bigelow rabbitbrush, Bigelow sagebrush, and bitterbrush with abundant Bolack's sand verbena in the area; gray sandy loam residuum (Figures 2.10 and 4.11)
BPI 60	N 4082263, E 752850	1 Aztec gilia plant in road cut of Nacimiento soils within 1 m of two-track road; on gray sandy loam residuum (Figures 2.10, 4.11, and 4.34)
BPI 61	N 4082254, E 752829	2 Aztec gilia plants in road cut of Nacimiento soils within 2 m of two-track road; gray sandy loam residuum (Figures 2.10, 4.11, and 4.34)

Table 4.5 Biological Points of Interest (Continued)

BPI 62	N 4082205, E 752801	5 Brack's hardwall cacti on Nacimiento soils in 10 x 15 m area; in P-J, Bigelow rabbitbrush, James sea heath, and galleta association in gray sandy loam residuum (Figures 2.10 and 4.11)
BPI 63	N 4082325, E 752839	3 Brack's hardwall cacti 2 m apart on Nacimiento soils; in P-J, Bigelow rabbitbrush, and galleta association in gray sandy loam residuum (Figures 2.10, 4.11, and 4.35)
BPI 64	N 4086565, E 758530	1 Brack's hardwall cactus on Nacimiento soils; in P-J and Bigelow rabbitbrush association on gray sandy loam residuum (Figures 2.12, 4.13, and 4.36)
BPI 65	N 4076774, E 727825	5 probable Cottam's milkvetch plants in 5 m diameter area on Kirtland Shale sandstone slickrock; in sparse salt desert scrubland dominated by Bigelow sagebrush on light reddish brown fine sandy loam residuum (Figures 2.2 and 4.3)
BPI 66	N 4077374, E 728066	One San Juan milkweed plant in salt desert scrubland dominated by Bigelow sagebrush and shadscale (Figures 2.2 and 4.3)
BPI 67	N 4081899, E 748777	1 Brack's hardwall cactus on Nacimiento soils; in P-J and Bigelow rabbitbrush association on gray sandy loam residuum (Figures 2.9 and 4.10)
BPI 68	N 4081882, E 748984	Concentration of 7 Aztec gilia plants on Nacimiento soils; in P-J and Bigelow rabbitbrush association on gray sandy loam residuum (Figures 2.9 and 4.10)
BPI 69	N 4082254, E 752769	Concentration of 28 Aztec gilia plants on Nacimiento soils; in P-J and Bigelow rabbitbrush association on gray sandy loam residuum (Figures 2.10 and 4.11)
BPI 70	N 4082183, E 752828	Concentration of 17 Aztec gilia plants on Nacimiento soils; in P-J and Bigelow rabbitbrush association on gray sandy loam residuum (Figures 2.10 and 4.11)
BPI 71	N 4082277, E 753291	Concentration of 2 Aztec gilia plants and 4 Brack's hardwall cacti on Nacimiento soils; in P-J and Bigelow rabbitbrush association on gray sandy loam residuum (Figures 2.10 and 4.11)

Figure 4.26 View of BPI 44 Facing Northwest (Top) at Red-tailed Hawk on Nest at BPI 44 (Bottom)

Figure 4.27 View South of BPI 45 (Top) and Naturita Milkvetch Plant at BPI 45 (Bottom)

Figure 4.28 Cliff Swallow Nests at BPI 48 (Top) and Clover's Sclerocactus in the Project Area (Bottom)

Figure 4.29 View of Nest Site at BPI 52 (Top) and Red-Tailed Hawk at BPI 52 (Bottom)

Figure 4.30 BPI 53 Facing West (Top) and Aztec Gilia Plant at BPI 53 (Bottom)

Figure 4.31 BPI 54 Facing North (Top) and Aztec Gilia Plant at BPI 54 (Bottom)

Figure 4.32 Young Brack Hardwall Cacti at BPI 53 (Top) and BPI 56 (Bottom)

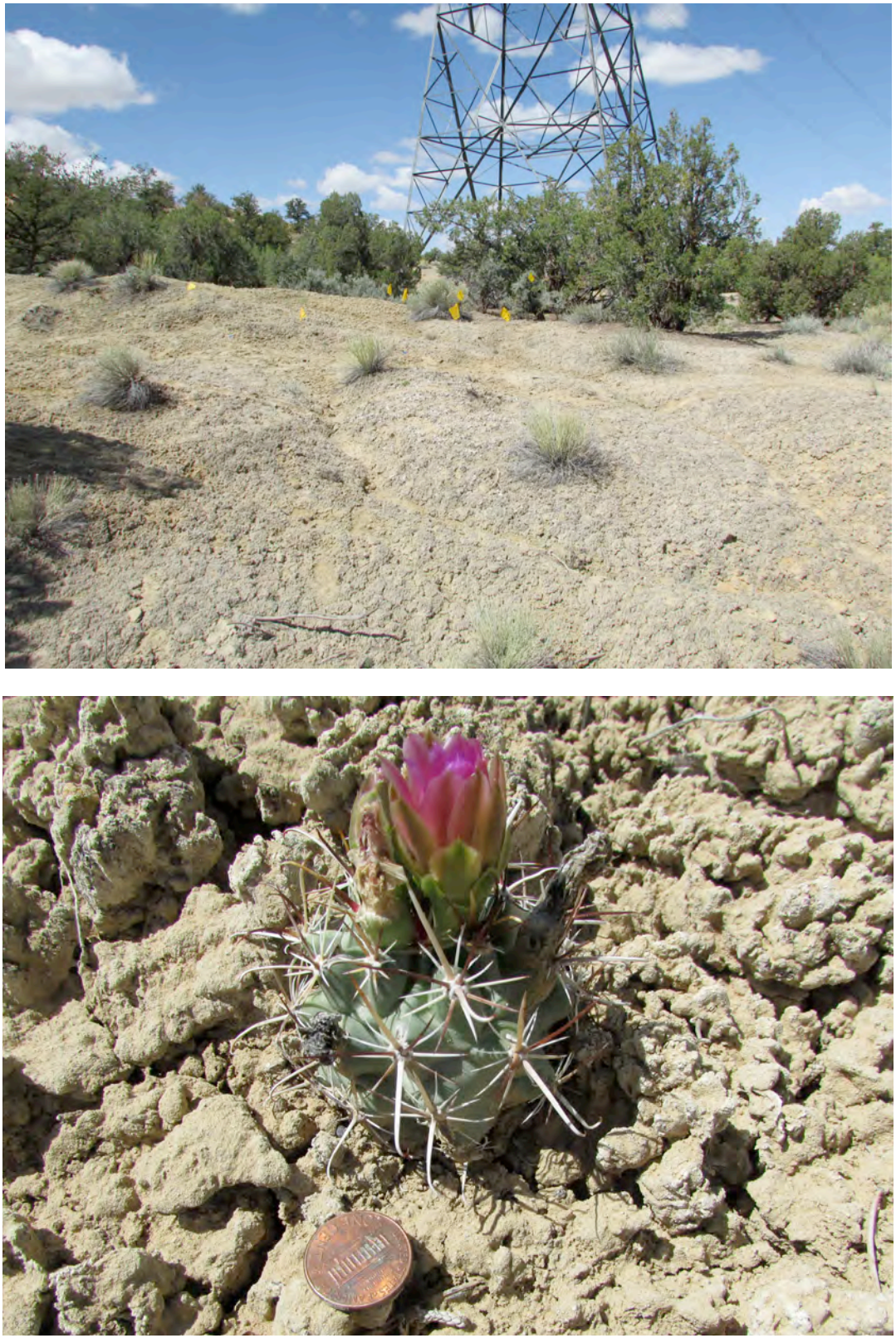

Figure 4.33 View Southwest of BPI 56 (Top) and Brack Hardwall Cactus at BPI 56 (Bottom)

Figure 4.34 BPI 60 Facing Northeast (Top) and BPI 61 Facing East (Bottom) With Clipboard Next to Aztec Gilia Plants

Figure 4.35 BPI 63 Facing Northwest (Top) and Brack Hardwall Cactus at BPI 63 (Bottom)

Figure 4.36 View of BPI 64 Facing Northeast (Top) and Brack Hardwall Cactus at BPI 64 (Bottom)

areas were surveyed by SEAS in the spring of 2013 and overlapped, in part, with the areas surveyed for these species by Parametrix in the spring of 2012 (Parametrix 2012). Between these two surveys, 11 locations (BPIs 53-55, 57, 59-61, and 68-71) with concentrations of Aztec gilia and nine locations (BPI's 53, 55, 56, 58, 62-64, 67, and 71) with Brack Hardwall cacti were encountered and documented. Three of these locations (BPIs 53, 55, and 71) contained both Aztec gilia and Brack hardwall cacti. One location (BPI 51) with over 250 Aztec gilia plants and at least four Brack hardwall cacti was found by SEAS outside the project area and buffer zone while hiking into one of the rare plant survey areas. BPI 51 is only reported here for conservation purposes and it will not be affected by the SJBEC. Incidentally encountered sensitive rare plants lacking formal regulatory protection, for which the BLMFFO did not require species-specific surveys, were also identified during the 2013 survey, including one Naturita milkvetch (*Astragalus naturitensis*) location (BPI 45) and three probable Cottam's milkvetch (*Astragalus cottamii*) locations (BPIs 46, 47, and 65). At the three Cottam's milkvetch locales, the plants lacked flowers and pods and could not be positively identified, although the vegetative traits and habitat type (slickrock) suggest they are Cottam's milkvetch. A single San Juan milkweed (*Asclepias sanjuanensis*) plant (BPI 66) was identified by Parametrix in 2012.

Within the SJBEC project area and 50-foot buffer zone, a total of 130+ Aztec gilia plants, 52 Brack hardwall cacti, 13 probable Cottam's milkvetch, two Naturita milkvetch, and one San Juan milkweed were identified during the rare plant surveys. All of these rare plants have been avoided in the SJBEC design and will not be directly impacted by the project. Additionally, several occurrences of Clover's sclerocactus (*Sclerocactus cloveriae*; Figure 4.28) were encountered in the course of the 2013 rare plant surveys, of which the Brack hardwall cactus is a subspecies. However, the Clover's sclerocactus has no formal or informal status and project sponsors may voluntarily have any Clover's sclerocacti impacted by their projects transplanted to similar locations out of the impact areas. The Clover's sclerocactus locations were documented by GPS equipment and are depicted on the plant community maps for conservation purposes and species distribution data (Figures 4.2 to 4.19). These occurrences will be avoided if feasible or will be transplanted outside of the impact area during fall, the preferred period, in similar habitat.

5.0 Threatened and Endangered Species and Status

This section evaluates the potential of species listed as endangered, threatened or candidates for federal listing with the United States Fish & Wildlife Service (USFWS) under the ESA [16 U.S.C. 1531 et. seq.] (ESA) and of species listed as endangered, threatened, sensitive or species of concern by the State of New Mexico and BLMFFO. The USFWS (2012), the BISONM (BISONM 2012), the NMRPTC (NMRPTC 2012), and the BLMFFO (2003), and other sources, were used to compile a list of protected and sensitive species that have potential to occur in San Juan County. Names and regulatory status of ESA and State of New Mexico listed species are presented in Table 5.1 and given detailed consideration below. The Gunnison's prairie dog montane populations were recently listed as candidate species under the ESA. While Gunnison's prairie dogs occur within the project (BPIs 17, 21-24, and additional BLM recorded areas), they are considered the unprotected plains populations and not subject to ESA protection. Additionally, this section evaluates the potential for protected or sensitive/rare species listed by the State of New Mexico and the BLMFFO to occur within the project area. The USFWS, NMDGF, NMRPTC, and BLMFFO species of concern (SOC) lists were consulted to compile tables of sensitive species with potential to occur in San Juan County. These species lacking formal regulatory status and their habitat affiliations are addressed in Table 5.2 for wildlife species and Table 5.3 for plant

Table 5.1 Species Listed Under the Endangered Species Act and State of New Mexico Threatened and Endangered Species with Potential to Occur in San Juan County, New Mexico

Common Name	Scientific Name	Navajo, Federal, State Status
American peregrine falcon	*Falco peregrinus*	NM: Threatened, USFWS: SC, BLMFFO Special Management Species, MBTA
Aztec gilia	*Aliciella formosa*	NM: Endangered, BLMFFO Special Management Species , USFWS: SC
Bald Eagle	*Haliaeetus leucocephalus*	NM: Threatened, Bald Eagle Protection Act, BLMFFO Special Management Species, MBTA
Black-footed ferret	*Mustela nigripes*	USFWS: Endangered
Brack hardwall cactus	*Sclerocactus clovieriae ssp. brackii*	NM: Endangered, BLMFFO Special Management Species, USFWS: SC
Brown pelican	*Pelecanus occidentalis carolinensis*	USFWS: Endangered, NM: Endangered, MBTA
Canada lynx	*Lynx canadensis*	USFWS: Candidate
Colorado pikeminnow	*Ptychocheilus lucius*	USFWS: Endangered, NM: Endangered
Common black-hawk	*Buteogallus anthracinus anthracinus*	NM: Threatened, MBTA
Gray Vireo	*Vireo vicinior*	NM: Threatened, MBTA
Knowlton cactus	*Pediocactus knowltonii*	USFWS: Endangered
Mancos milkvetch	*Astragalus humillimus*	USFWS: Endangered
Mesa Verde cactus	*Schlerocactus mesae-verdae*	USFWS: Threatened
Mexican spotted owl	*Strix occidentalis lucida*	USFWS: Threatened, NM: Sensitive, MBTA
Razorback Sucker	*Xyrauchen texanus*	USFWS: Endangered; NM: Sensitive
Roundtail chub	*Gila robusta*	USFWS: Candidate, NM: Endangered
Southwestern willow flycatcher	*Empidonax trailii extimus*	USFWS: Endangered, NM: Endangered, MBTA
Spotted Bat	*Euderma maculatum*	NM: Threatened
Yellow-billed cuckoo	*Coccyzus americanus*	USFWS: Candidate, BLMFFO Special Management Species, NM: Sensitive, MBTA

Table 5.2 Animal Species of Special Concern with Potential to Occur in San Juan County, New Mexico

Common *Name*	Scientific Name/Status	Habitat	Likelihood of Occurrence
Baird's sparrow	*Ammodramus bairdii* NM: Threatened; NM BLM: SOC; MBTA	Found in a variety of habitats from desert grasslands in the south part of the state to prairies in the northeast and mountain meadows in the San Juan and Sangre de Cristo mountains	Suitable habitat is not present and out of known geographic range
Bendire's thrasher	*Toxostoma bendirei* NM BLM: SOC; MBTA	Occur in semi-desert and desert areas with large shrubs and open ground, open woodlands with scattered shrubs and trees	Suitable habitat is not present and on edge of known geographic range in far NE AZ
Big free-tailed bat	*Nyctinomops macrotis* NM: SOC	In habits a wide variety of habitats from desert scrub to ponderosa pine and piñon-juniper forests; roosts in crevices on cliff faces or in buildings	**Suitable habitat may be present on cliffs and crevices along northern tier of project area (Figures 4.16 to 4.19), and various ledge and cliff zones from Piñon Mesa to Westwater Arroyo area (Figures 4.3 to 4.6)**
Black swift	*Cypseloides niger borealis* NM: SOC; MBTA	Nests on cliffs, in trees or behind waterfalls, near wetlands, lakes and streams	Suitable habitat near surface water is not present.
Black tern	*Chlidonias niger* USFWS: SOC; MBTA	Nests in vegetation of marshes with open water on prairies, rare migrant in NM	Suitable prairie habitat with open water is not present
Broad-billed hummingbird	*Cynanthus latirostris magicus* NM: Threatened; MBTA	Arid scrub, open deciduous forest, semi-desert and other open arid habitats	Suitable habitat is not present and well out of known range in SE AZ and SW NM
California kingsnake	*Lampropeltis getula californiae* NM: SOC	In NM, only occurrence along San Juan River in Russian olive thickets	**Suitable habitat may be present on La Plata River floodplain and channel (Figure 4.10)**
Chuska Mountains checkerspot butterfly	*Euphydryas anicia chuskae* USFWS: SOC	Occurs in high altitude pine forests in the Chuska Mountains of NM and AZ	Suitable high altitude pine forest habitat is not present
Ferruginous hawk	*Buteo regalis* BLM: SMS; MBTA	Preferred habitat includes open prairie, arid grasslands, brushy open country, and badlands	**Suitable habitat may be present within project area, although BLMFFO states there are no ferruginous hawks on the NM side of the SJBEC**

Table 5.2 Animal Species of Special Concern with Potential to Occur in San Juan County, New Mexico (Continued)

Fringed myotis bat	*Myotis thysanodes thysanodes* NM: SOC	Occurs throughout western US, roosting in caves and buildings; grasslands to ponderosa pine forests in NM	**Suitable habitat may occur in sporadic ledge/cliff zones along northern tier of project and from Piñon Mesa to Westwater Arroyo (Figures 4.3 to 4.6 and 4.16 to 4.19)**
Golden eagle	*Aquila chrysaetos* Bald and Golden Eagle Protection Act; BLM: SMS; MBTA	Prefers remote terrain, typically nesting on cliffs over 100 ft tall in sheltered locales, foraging habitat includes desert grasslands and desert scrubland	**Suitable habitat may occur in Cox Canyon area and known nests are within 1/3 mile of Structure 235 and road (Figures 4.18 and 4.19)**
Gunnison's prairie dog	*Centrocercus minimus* NM: SOC; NM BLM: SOC	Resides in grassland habitats from low valleys to mountain meadows	**Present, active colonies recorded by the BLM within or near Structures 1-4, 120, 129-131, & access roads; newly observed prairie dog colonies occur at BPIs 17 and 21-24 (Figures 4.3 to 4.5, 4.13, and 4.18)**
Least tern	*Sterna antillarum athalassos* NM: Endangered; MBTA	In New Mexico nests along alkali flats, occurs along major rivers and lake shores	Suitable shoreline habitat or alkali flat habitat is not present
Little brown myotis bat	*Myotis lucifugus carissima* NM: SOC	Found in a wide variety of habitat types. Forages over water, roosting in trees, caves, buildings, mines, cliffs an wood piles	Suitable surface water foraging habitat is not present within or near project area
Loggerhead shrike	*Lanius ludovicianus excubitorides* NM: SOC; MBTA	Occurs in open grassland to desert scrub and occasionally open woodland	**Present, species was observed at BPI 5 and on an access road in west portion of the project with potential to occur in all DSHB 1 habitats (Figure 4.4)**
Long-eared myotis	*Myotis evotis evotis* NM: SOC	Pinyon-juniper woodlands to subalpine forests, foraging over water and edge zones; roosts in trees, caves, and mines	**Suitable habitat may occur in sporadic ledge/cliff zones along northern tier of project and from Piñon Mesa to Westwater Arroyo (Figures 4.3 to 4.6 and 4.16 to 4.19)**

Table 5.2 Animal Species of Special Concern with Potential to Occur in San Juan County, New Mexico (Continued)

Long-eared myotis	*Myotis evotis evotis* NM: SOC	Pinyon-juniper woodlands to subalpine forests, foraging over water and edge zones; roosts in trees, caves, and mines	**Suitable habitat may occur in sporadic ledge/cliff zones along northern tier of project and from Piñon Mesa to Westwater Arroyo (Figures 4.3 to 4.6 and 4.16 to 4.19)**
Long-legged myotis	*Myotis volans interior* NM: SOC	High, open forests from ponderosa pine and above, roosting in tree cavities, buildings, and rock crevices	Suitable high open forested habitat is not present
Mountain plover	*Charadrius montanus* NM: SOC; MBTA	Occurs in arid grassland habitat, particularly in areas disturbed by prairie dogs and livestock	**Suitable may be present in disturbed Desert Grassland 1 habitat west of Piñon Mesa, particularly near Gunnison's prairie dog colonies (Figures 4.3 to 4.6)**
New Mexico silverspot butterfly	*Speyeria nokomis nitocris* USFWS: SOC	Wet meadows and edges, spring areas; P-J woodlands in mountain or canyon terrain	Suitable mountain or canyon habitat with wet meadows and springs is not present
Northern goshawk	*Accipiter gentillis atricapillus* NM: SOC; MBTA	Mature and uneven aged mixed conifer forests, often in shady and deep canyons	Suitable conifer forest habitat is not present
Prairie falcon	*Falco mexicanus* BLMFFO: SMS; MBTA	Occurs in open country of plains, grasslands, and scrublands, nesting on cliffs	**Present, observed near Structure 196 with potential to occur in Farmington Glade and open country west of Piñon Mesa; known nest within 1/3 mile of project (Figure 4.16)**
Pinyon jay	*Gymnorhinus cyanocephalus* BLM: SOC; MBTA	Occurs in a variety of habitats including pinyon-juniper woodland, conifer and pine forests, scrub oak, greasewood and sagebrush shrubland	**Suitable habitat is present from Piñon Mesa east and northeast to the east end of the NM project area in PJ 1-7 communities (Figures 4.6 to 4.19)**
Red fox	*Vulpes vulpes fulva* NM: SOC	Rare reports from the mountainous areas of northern New Mexico	Suitable mountainous habitat is not present

Table 5.2 Animal Species of Special Concern with Potential to Occur in San Juan County, New Mexico (Continued)

Ringtail	*Bassariscus astutus arizonensis* NM: SOC	Inhabits rocky places in mountains and canyons, particularly talus slopes	Suitablle habitat may be present in talus slopes at base of canyon walls along the northern tier of the project area
San Juan checkerspot butterfly	*Euphydryas anicia chuskae* USFWS: SOC	Occurs in high altitude pine forests in the Chuska Mountains of NM and AZ	Suitable high altitude pine forest habitat is not present
Townsend big-eared bat	*Corynorhinus townsendii pallescens* NM: SOC; NM BLM: SOC	Roosts and rears young in crevices, caves, lava tubes, mines, and buildings from the desert to montane forests	**Suitable habitat may occur in sporadic ledge/cliff zones along northern tier of project and from Piñon Mesa to Westwater Arroyo (Figures 4.3 to 4.6 and 4.16 to 4.19)**
Western burrowing owl	*Athene cunicularia hypugea* BLM: SMS; USFWS: SOC; MBTA	Occupies mammal burrows, usually prairie dog burrows, from grasslands to desertscrub	**Suitable nesting habitat (prairie dog colonies) is present near Structures 1-4, 120, 129-131; BPIs 17 and 21-24 (Figures 4.3 to 4.5, 4.13, and 4.18)**
Western Small-footed myotis	*Myotis ciliolabrum Melanorhinus* NM: SOC	Montane woods, roosting in caves, crevices, mines, buildings, boulders and bark	Suitable montane wooded habitat is not present
Western spotted skunk	*Spilogale gracilis* NM: SOC	Brush to sparse woods, among boulder piles, along streams, sometimes prairies	**Suitable habitat may be present along the La Plata River from Structures 96-97 (Figure 4.10)**
Yellow-bellied marmot	*Marmota flaviventris luteola* NM: SOC	In NM, inhabits outcrops from spruce-fir forest zone to alpine tundra	Potentially suitable habitat is not present.
Yuma myotis	*Myotis yumanensis yumanensis* NM: SOC	Forages over water from low deserts to pinyon-juniper woodlands, roosts in mines, buildings, crevices, and under bridges	**Suitable habitat may occur in sporadic ledge/cliff zones along northern tier of project and from Piñon Mesa to Westwater Arroyo (Figures 4.3 to 4.6 and 4.16 to 4.19)**

Table 5.3 Rare Plant Species of Concern with Potential to Occur in San Juan County, New Mexico

Common Name	Scientific Name	Habitat	Likelihood of Occurrence
Acoma fleabane	*Erigeron acomanus* NM: SOC; USFWS: SOC; NM BLM: SSPS	Cliff bases in P-J woodlands on sandy slopes derived from Entrada Sandstone near 7,000 ft	Suitable Entrada Sandstone habitat is not present
Arboles milkvetch	*Astragalus oocalycis* NM: SOC	Resides on clay, seleniferous soils in sagebrush, P-J woodland, and transitional zones, often in disturbed areas and road cuts; 5,600-7,200 ft	Suitable habitat is not present, project is well west of geographic distribution
Bisti fleabane	*Erigeron bistiensis* USFWS: SOC	Occurs on fine sandy substrates derived from the Ojo Alamo Formation in desertscrub communities; 6,400 ft	**Present, found in several locations between Structures 90-92 and access road heading northeast between Structures 98 and 99 (Figures 4.10 and 4.11); however NMRPTC has questioned the taxonomy of this species**
Bolack's sand verbena	*Ambronia bolacki* NM: SOC	Gypsiferous clay soils, often on steep hillsides in juniper woodland or saltbush communities; 5,250-5,750 ft	**Present, found in several locations between Structures 90-92 and access road heading northeast between Structures 98 and 99 (Figures 4.10 and 4.11); however NMRPTC has questioned the taxonomy of this species**
Chaco milkvetch	*Astragalus micromerius* NM: SOC; USFWS: SOC	Outcrops of sandstone usually with Todilto gypsum or limestone in P-J woodland or Great Basin desertscrub; 6,600-7,300 ft	Suitable Todilto gypsum or limestone habitat is not present
Chuska milkvetch	*Astragalus chuskanus* NM: SOC; USFWS: SOC	Occurs in montane coniferous forest openings with decomposed Chuska Sandstone substrate; above 5,500 ft	Suitable Chuska Sandstone habitat is not present
Clifford's groundsel	*Senecio cliffordii* NM: SOC; USFWS: SOC	Occurs on sand or limy mudstone in P-J woodland into mixed conifer forest from 7,380 to 7,700 ft	Suitable coniferous forest habitat is not present

Table 5.3 Rare Plant Species of Concern with Potential to Occur in San Juan County, New Mexico (Continued)

Clifford's milkvetch	*Astragalus cliffordii* NM: SOC; USFWS: SOC	Inhabits rim rock ledges of the Mesa Verde group in sagebrush and P-J woodland, currently known only from type location at 6,800 ft	Suitable Mesaverde Group habitat is not present
Clipped buckwheat	*Eriogonum lachnogynum* var. *colobum* NM: SOC; USFWS: SOC	Sandy or gypseous limestone ridges and mesa edges in P-J woodlands from 6,820 to 7,540 ft	Suitable limestone habitat is not present
Cottam's milkvetch	*Astragalus cottamii* NM: SOC; USFWS: SOC	Inhabits rimrock P-J woodland habitats of Cretaceous sandstone derived soils, often in depressions and crevices; 5,000-6,000 ft	**Present, three locations (BPIs 46, 47, and 65) with 13 probable Cottam's milkvetch plants were identified (Figures 4.3 and 4.5), although these plants lacked flowers or fruit for confirmation**
Grama grass cactus	*Pediocactus papyracanthus* NM: Endangered; USFWS: SOC	Occurs in P-J woodlands and desert grasslands and mostly associated with blue grama and dropseed communities	Suitable habitat may be present, but well out of known geographic range
Heil's milkvetch	*Astragalus heilii* NM: SOC; USFWS: SOC	Inhabits rim rock ledges of the Mesa Verde group in sagebrush and P-J woodlands, currently known only from type location near Borego Pass at 7,200 ft	Suitable habitat in sagebrush of P-J woodlands is not present, well out of known geographic range
Mancos saltplant	*Proatriplex pleiantha* NM: SOC; USFWS: SOC	Saline clays of the Mancos-Fruitland shale in desert badlands; 5,000-5,500 ft	**Suitable habitat may be present on Fruitland soils west of Piñon Mesa from The Meadows to BOL at Shiprock Substation (SDS 1-2) (Figures 4.3 to 4.6)**
Naturita milkvetch	*Astragalus naturitensis* NM: SOC; USFWS: SOC	Occupies sandstone ledges and rimrock of canyons in P-J woodland; 5,400-6,200 ft	**Present, two Naturita milkvetch plants were identified at BPI 45 in the eastern buffer zone (Figures 2.2, 4.3, and 4.27)**
Navajo bladderpod	*Lesquerella navajooensis* NM: SOC; USFWS: SOC	P-J woodland habitat along Todilto limestone mesa rims; 7,200-7,600 ft	Suitable Todilto limestone habitat is not present

Table 5.3 Rare Plant Species of Concern with Potential to Occur in San Juan County, New Mexico (Continued)

Navajo phlox	*Phlox cluteana* NM: SOC; USFWS: SOC	Shady sites with sandy substrates and leaf litter in P-J, oak, or ponderosa pine woods; 6,000-10,400 feet	Suitable habitat may be present, although well out of known geographic range
Pagosa milkvetch	*Astragalus missouriensis* var. *humistratus* NM: SOC; USFWS: SOC	Mancos and Lewis Shales soils in P-J woodland with ponderosa pine	Suitable Mancos Shale and Lewis Shale habitat is not present
Pagosa phlox	*Phlox caryophylla* NM: SOC; USFWS: SOC	Open P-J woodlands and sagebrush in deep soils	Suitable habitat may be present, but well out of known geographic range
Pagosa Springs bladderpod	*Physaria pruinosa* NM: SOC; USFWS: SOC	Fine-textured soils on Mancos Shale; barren areas adjacent to montane meadows and woodlands; 6,800 to 8,300 ft	Suitable Mancos Shale soil habitat is not present
Parish's alkali grass	*Puccinellia parishii* USFWS:SOC; NM: Endangered; BLMFFO: SSPS	Inhabits alkaline soils near seeps, springs, and streams; 2,950-6,070 ft	Suitable moist alkaline soil habitat is not present
San Juan milkweed	*Asclepias sanjuanensis* NM: SOC; USFWS: SOC; BLMFFO SSPS	Sandy loam soils in juniper savanna and desert scrubland, often in disturbance; 5,000-5,500 ft	**Present, one San Juan milkweed plant was identified at BPI 66 (Figure 4.3)**
Sarah's buckwheat	*Eriogonum lachnogynum* var. *sarahiae* NM: SOC; USFWS: SOC	Sandy limestone ridges and mesa edges in P-J woodlands from 5,900 to 7,540 ft	Suitable limestone ridge habitat is not present
Sessile-flowered false carrot	*Aletes sessiliflorus* CNHP: Sensitive	Rocky ledges, talus, cliffs, and crevices on San Jose and Nacimiento Formation sandstones in P-J woodlands; 6,000-7,500 ft	**Suitable habitat may occur throughout northeast project area where corridor parallels state line, corresponding with the PJ 3 community (Figures 4.16 to 4.19)**
Sivinski's fleabane	*Erigeron* sivinskii NM: SOC; USFWS: SOC	P-J woodland habitat with Chinle shale substrates; 6,100-7,400 ft	Suitable Chinle shale substrates are not present
Taos milkvetch	*Astragalus puniceus* var. *gertrudes* NM: SOC; USFWS: SOC	P-J woodlands in a narrow range south of Taos on dry banks and gravelly benches; 6,,000-7,000 ft	Suitable habitat may be present, but well out of known geographic range

species. Species detailed in Tables 5.2 and 5.3 do not have formal regulatory status, with the exception of MBTA species, and are considered here for conservation purposes only.

5.1 Mammals

5.1.1 Black-footed Ferret

The black-footed ferret (*Mustela nigripes*) is listed as endangered by the USFWS under the Endangered Species Act of 1973. The black-footed ferret is a carnivore from the weasel family (*Mustelidae*)(Burt and Grossenheider 1980: 58-60). Its habitat consists of plains, desert grasslands, and desert scrubland communities that support prairie dogs towns, its primary food source. The black-footed ferret requires prairie dog towns of at least 80 ac for black-tail prairie dogs and 200+ ac for the white-tail and Gunnison's prairie dogs for suitable habitat (USFWS 1989). A number of active Gunnison's prairie dog towns were found along the proposed project, primarily concentrated in DG 1, SDS, and GBDS at the west end of the project (Figures 4.3 to 4.5). One prairie dog colony large enough to be considered potential habitat has been mapped by the BLMFFO. This colony is located at the western terminous of the proposed project area near the Shiprock Substation and is approximately 1176 ac in size extending north to northwest from the vicinity of Structures 1 to 5. The remaining active prairie dog colonies recorded by the BLMFFO and others were not of sufficient size to be considered suitable habitat. No black-footed ferrets were observed in the project area, although these are nocturnal creatures and unlikely to be identified during daytime surveys. The BLMFFO requires black-footed ferret survey following USFWS protocol guidelines to determine presence/absence in potentially suitable habitat (200+ acre prairie dog colonies). A pre-construction black-footed ferret USFWS protocol survey should be conducted within the identified suitable habitat (Figures 4.3 to 4.5) by a qualified biologist in spring of the year constuction is to occur. The results of the survey would determine if mitigation measures are necessary.

5.1.2 Canada Lynx

The Canada lynx (*Lynx canadensis*) is a federally listed threatened species under the ESA of 1973 and considered endangered by the State of Colorado. A member of the cat family (*Felidae*), the Canada lynx is a carnivore that historically occurred throughout northern United States and Canada. Its preferred habitat in the western United States consists of sub-alpine coniferous forests in mountainous terrain with open canopies, outcrops and boulders, and sufficient under story herbage to support the snowshoe hare, its primary food source (Fitzgerald et al. 1994). The Canada lynx is an elusive creature that does not occur in the open, preferring forested corridors for travel. They are often associated with areas subject to deep and lingering snow pack. Extirpated from 13 of the 16 states Canada lynx were historically known to occupy, the Colorado Parks and Wildlife reintroduced the lynx in 1999 to 2000 in southern Colorado, with mixed results (USFWS 2000). No potential habitat for the Canada lynx occurs in the project area and no Canada lynx were observed. The project is not expected to impact the Canada lynx.

5.1.3 Spotted Bat

The spotted bat (*Euderma maculatum*) is a New Mexico threatened species and member of the evening bats family (*Vespertilionidae*). The bat is distinguished by its large ears and white spots on the shoulder and tail base (Whitaker 1980: 327). Their preferred foraging habitat is over water and high meadows, while roosting and nesting habitat consists primarily of crevices and boulders on rocky slopes adjacent to water. In New Mexico, the spotted bat is most commonly associated with woodland and forested areas in the Jemez, San Mateo, and Mogollon Mountains. At least one occurrence is known from Aztec, New

Mexico in San Juan County (NMDGF 1988). Foraging and roosting habitat adjacent to surface water does not occur in the project area and none were observed. The project is not expected to impact the spotted bat.

5.2 Birds

5.2.1 American Peregrine Falcon

The American peregrine falcon (*Falco peregrinus*) is a New Mexico threatened species, a USFWS species of concern, a BLMFFO Special Management Species, and is also protected under the MBTA. The American peregrine falcon is a member of the *Falconidae* family and identified by long pointed wings, toothed upper mandible, and has a much heavier malar mark (moustache) than the most similar species, the prairie falcon. The American peregrine falcon nests on cliffs, usually over 200 ft high, within wooded and forested habitats, typically in close proximity to riparian zones. In normal flight, the peregrine falcon's speed averages 80-100 kph, while it can reach 450 kph during dives. It primarily feeds on birds with the most common prey including mourning doves, pigeons, woodpeckers, swifts, shorebirds, waterfowl, and bats. The nest site usually consists of a narrow ledge and eggs are laid directly on the bare substrate and can be difficult to locate (BISONM 2012). Potentially suitable nesting habitat occurs within a 1/3-mile radius of the project area on the high cliffs in the Cox Canyon area. The BLMFFO requests that a 1/3-mile radius around active peregrine nest sites are avoided by construction or other disturbances from March 1 to June 30. If construction activities in the Cox Canyon vicinity cannot be avoided during the March 1 to June 30 period it is recommended that a pre-construction survey be conducted to determine if breeding peregrine falcons are present within the 1/3-mile radius. The BLMFFO would then determine if construction could proceed or if seasonal restrictions and buffers are necessary.

5.2.2 Bald Eagle

The bald eagle (*Haliaeetus leucocephalus*) is a federally protected species under the Bald and Golden Eagle Protection Act (16 USC 668-668d) of 1940 (as amended) and MBTA, listed as threatened by the State of New Mexico, and is a BLMFFO Special Management Species. The bald eagle is a raptor and member of the eagle, hawk, and kite family (*Accipitridae*) (Udvardy and Farrand 1994: 430). The bald eagle occurs throughout North America, but only summers along major water bodies, particularly Florida, Chesapeake Bay, northern coasts, and boreal lakes from western Ontario to British Columbia (Wheeler and Clark 1999: 117). Bald eagle nesting habitat consists of large trees or cliffs near water containing abundant fish populations, but generally does not breed in the Four Corners region. It winters locally along major rivers, reservoirs, and other areas where fish or carrion are available for foraging (USFWS 1998). The nearest known population of wintering bald eagles along the San Juan River occurs north of Navajo Reservoir where the BLMFFO has several Areas of Critical Environmental Concern (ACEC) designated for them. Suitable habitat near open water for the bald eagle does not occur in or adjacent to the project and no bald eagles were observed. The project is not expected to impact the bald eagle in the New Mexico portion of the SJBEC.

5.2.3 Brown Pelican

The brown pelican (*Pelecanus occidentalis*) is a federally and New Mexico listed endangered species. The large bird is also protected under the MBTA. The brown pelican is in the pelican family (*Pelecanidae*) and distinguished by its large size and gray to brown body. It eats fish, which it captures

by diving from the air. Habitat for the brown pelican includes coasts, with breeding colonies commonly occurring on coastal islands. The brown pelican is a vagrant in New Mexico and at least one verified sighting was made in San Juan County near Bloomfield (NMDGF 1988). Vagrant brown pelicans are extremely rare inland. Suitable lake and shoreline habitat that may be utilized by vagrants is not present in or adjacent to the project area and no brown pelicans were observed. Tri-State also plans to mark the transmission lines spanning the La Plata River and Animas River valleys to minimize collision risks. The project is not expected to impact the brown pelican.

5.2.4 Common Black-Hawk

The common black-hawk (*Buteogallus anthracinus*) is a member of the hawk and eagle family (*Accipitridae*), is a State of New Mexico listed threatened species, and protected under the MBTA. The common black-hawk is most readily identified by a broad, white band across the tail. It preys on a wide variety of animals, including fish, amphibians, reptiles, mammals, birds, and even insects and crayfish (NMDGF 1988). It winters and breeds primarily south of the United States, but is known to breed in some areas of the Southwest, well south of the proposed project area, although an occasional migrant may pass through the area. Its habitat is desert stream courses with well-developed riparian woodlands and forests (NMDGF 1996). Suitable riparian forest habitat with perennial stream courses does not occur in the project area given the intermittent nature of the La Plata River and the project is well north of the common black-hawk's breeding range. The project is not expected to impact the common black-hawk.

5.2.5 Gray Vireo

The gray vireo (*Vireo vicinior*) is a member of the vireo family (*Vireonidae*), is listed as threatened by the State of New Mexico, and protected under the MBTA. The bird is gray above and whitish below, with a faint, whitish eye ring. It is an active insectivore, and differs from other vireos by the sideway twitching of its tail (Udvardy and Farrand 1977: 688-689). The gray vireo is sporadic throughout the Four Corners states, southern California, and west Texas. Like most vireos, the nests are often parasitized by cowbirds. It is a migratory species, wintering in Latin America (NMDGF 1994). In northern New Mexico, its preferred breeding habitat is open woodlands, particularly juniper with a diverse understory of shrubs (Hubbard 1985). It can also occur in broad bottom canyons, near head walls, outcrops, and in gently sloped bowls in P-J woodlands. Potentially suitable gray vireo habitat is present along the northern tier of the proposed project (from Structures 184 to 249; Figures 4.15 to 4.19). General surveys for MBTA-protected avian species would occur if construction activities cannot be avoided in this area during the MBTA breeding season (May 1 to July 31), which would include the gray vireo. The BLMFFO and State of New Mexico would then determine if construction could proceed or if mitigation measures are necessary.

5.2.6 Mexican Spotted Owl

The Mexican spotted owl (*Strix occidentalis lucida*) is a protected threatened species under the Endangered Species Act of 1973, protected under the MBTA, and listed as sensitive by the State of New Mexico. The Mexican spotted owl is a nocturnal forest dweller and member of the owl family (*Strigidae*)(Udvardy and Farrand 1994: 563). It lives in mature montane coniferous forest, preferring uneven-aged stands with high canopy closure, and flyways with some downed logs. It often nests on ledges, rocky areas, and small cliffs within its habitat. It sometimes lives in riparian woodlands and in shaded, woody, and steep canyons with cool microclimates (USFWS 1998). Mexican spotted owl habitat

does not occur in the project area and no Mexican spotted owls were observed. The project is not expected to impact the Mexican spotted owl.

5.2.7 Southwestern Willow Flycatcher

The Southwestern willow flycatcher (*Empidonax traillii extimus*) (SWWFC) is a protected threatened species under the Endangered Species Act of 1973, the MBTA, and considered endangered by the State of New Mexico. The SWWFC is a brownish, olive-green colored member of the tyrant flycatcher family (*Tyrannidae*) (Udvardy and Farrand 1994: 604-605). It lives along rivers, streams, or other wetlands with dense, multi-layered growth of willows or other shrubs and medium sized trees. The SWWFC is frequently parasitized by cowbirds (Sogge et al. 1997). The SWWFC can live wherever there is suitable habitat. On the Navajo Nation, it has been seen in less than ideal habitats. Breeding pairs have been reported along the San Juan River and Colorado River (NNHPDFW 2008). Potentially suitable SWWFC breeding habitat occurs at only one locale (BPI 14) within a dense mixed stand of native broadleaf trees and shrubs and exotic salt cedar forming a nearly continuous closed canopy along both sides of the La Plata River (Figures 4.10 and 5.1). The potentially suitable SWWFC locale is in dense, multiple strata, riparian forest/woodland habitat (RW 2 plant community) with a vertical profile of upper overstory trees (valley and narrow-leaved cottonwood), lower overstory trees (Russian olive, box elder), upper shrub understory (tamarisk, sandbar willow, NM olive), and lower herbaceous understory, including a component of surface water seasonally within and adjacent to the wooded stands.

The nearest known active breeding location occurs well southwest of the project along the San Juan River near Shiprock (NNHPDFW 2008). The potentially suitable wetland and riparian habitat in the project area (La Plata River and floodplain) will not be modified and will be spanned entirely by the transmission line (Figure 4.10). Provided that construction disturbance and related loud noises (e.g., helicopter stringing of power lines) does not occur during the breeding season, the proposed project is expected to have no impact on the SWWFC. The breeding season occurs from May 1 when nest site selection begins and ends by August 31, when chicks are fledged. If construction at La Plata River and/or the stringing of the power lines must occur during the nesting season in this area, a pre-construction USFWS protocol survey for the SWWFC should be performed to determine presence/absence. The USFWS and BLMFFO would then determine if construction could proceed or if mitigation measures are necessary.

5.2.8 Yellow-billed Cuckoo

The yellow-billed cuckoo (*Coccyzus americanus*) is a federal candidate for listing under the Endangered Species Act of 1973, protected under the MBTA, and listed as sensitive by the State of New Mexico. The yellow-billed cuckoo is a gray and white, medium-sized bird (12”) with a down-curved, yellow-based bill with long tail. The yellow-billed cuckoo is a member of the *Cuculidae* family (Udvardy and Farrand 1994: 553-554). It is omnivorous, but mostly feeds on caterpillars. Other prey includes cicadas,

Figure 5.1 View of Riparian Shrubland 1 (Top) and Riparian Woodland 2 (Bottom) Habitats Considered Potentially Suitable Southwestern Willow Flycather and Yellow-billed Cuckoo Reproductive Habitat

grasshoppers, beetles, bugs, ants, wasps, frogs, lizards, and small fruits (Howe 1986). The yellow-billed cuckoo winters in mature tropical forests, returning to the United States, northern Mexico and southern Canada for nesting (CBD 2000). The yellow-billed cuckoo breeds in low to mid-elevation riparian and deciduous woodlands, abandoned farms and orchards, and gallery riparian forests (Finch 1992). Potentially suitable yellow-billed cuckoo (YBC) breeding habitat occurs at the same location as cited above for the SWWFC (BPI 14; Figures 4.10 and Figure 5.1) within the dense riparian habitat along the La Plata River. The area possesses only a small component of gallery cottonwoods to the north of the project area making that habitat marginal. However, this riparian and wetland habitat will not be modified and is spanned entirely by Poles 96 and 97 (Figures 4.10 and Figure 5.1). Provided that construction disturbance and related loud noises (e.g., helicopter stringing of power lines) does not occur during the breeding season, the proposed project is not expected to impact the yellow-billed cuckoo. The breeding season occurs from May 1 when nest site selection can begin and ends by August 31, when the chicks are fledged. If construction at nearby Structure 96 and stringing of the power lines must occur during the nesting season, a pre-construction survey for the yellow-billed cuckoo should be performed to determine presence/absence. The USFWS and BLMFFO would then determine if construction could proceed or if mitigation measures are necessary.

5.3 Fish

5.3.1 Colorado Pikeminnow

The Colorado pikeminnow (*Ptychocheilus lucius*), formerly known as the Colorado squawfish, is a member of the minnow family (*Cyprinidae*). The Colorado pikeminnow is a federally listed endangered species under the Endangered Species Act of 1973 and considered endangered by the State of New Mexico. Adult fish show a preference for deep pools with strong currents on major rivers with sandy to rocky substrates. Juvenile Colorado pikeminnow inhabit backwater eddies and side channels with silt to sand substrates (Haynes and Schuetze 1997). Historically, the Colorado pikeminnow was endemic to the entire Colorado River system, including the Gila and Salt Rivers, but is now restricted to the upper reaches of the watershed in Colorado, Utah, and New Mexico. A reproducing population of Colorado pikeminnow has been documented on the San Juan River between Shiprock, New Mexico to near the Four Corners area (Propst 1999). The San Juan River and associated 100-year floodplain do not occur within the project, although the project is within its watershed. Environmental protection measures, including drafting and implementing a stormwater pollution prevention plan (SWPPP) and other efforts, would minimize any potential short-term effects resulting from increased soil erosion (and possible sediment impairment in the lower La Plata, Animas, and middle and lower San Juan Rivers) due to vegetation removal and increased runoff from roadway grading activities and construction. In addition, no river water depletions are associated with the proposed project. The project is not expected to impact the Colorado pikeminnow.

5.3.2 Razorback Sucker

The razorback sucker (*Xyrauchen texanus*) is a member of the sucker family (*Catostomidae*) and listed as endangered by the USFWS and sensitive by the State of New Mexico. The razorback sucker once lived throughout the tributary system of the Colorado River, but is now restricted to only a few scattered areas. Historically, the razorback sucker was extirpated from the San Juan River, and restocking efforts have had unknown results (Propst 1999). The razorback sucker is found in large rivers, 1.2 to 3 m deep, with strong currents or backwaters with silt to rocky substrates (Haynes and Schuetze 1997). The San Juan

River and associated 100-year floodplain do not occur within the project, although the project is within its watershed. Environmental protection measures, including drafting and implementing a SWPPP and other efforts, would minimize any potential short-term effects resulting from increased soil erosion (and possible sediment impairment in the lower La Plata, Animas, and middle and lower San Juan Rivers) due to vegetation removal and increased runoff from roadway grading activities and construction. In addition, no river water depletions are associated with the proposed project. The project is not expected to impact the razorback sucker.

5.3.3 Roundtail Chub

The roundtail chub (*Gila robusta*) is from the minnow family (*Cyprinidae*) and is listed as endangered by the State of New Mexico and is a USFWS species of concern. Historically, the roundtail chub lived throughout the larger streams and rivers of the Colorado River watershed. In New Mexico, it was extirpated in the San Francisco and Zuni River drainages, with diminishing numbers in the San Juan and Gila River watersheds. Reduced flows, water diversions, and predation by non-native fish might be causing its decline(Sublette et. al. 1990). The roundtail chub lives in pools of large streams and rivers with moderate flow (NMDGF 1996). The roundtail chub prefers channels of larger rivers or in areas with cover from vegetation, overhanging cliffs, and boulders (Lee et al. 1981: 172). The San Juan River and associated 100-year floodplain do not occur within the project, although the project is within its watershed. Environmental protection measures, including drafting and implementing a SWPPP and other efforts, would minimize any potential short-term effects resulting from increased soil erosion (and possible sediment impairment in the lower La Plata, Animas, and middle and lower San Juan Rivers) due to vegetation removal and increased runoff from roadway grading activities and construction. In addition, no river water depletions are associated with the proposed project. The project is not expected to impact the roundtail chub.

5.4 Plants

5.4.1 Aztec Gilia

The Aztec gilia (*Aliciella Formosa* [Greene ex A. Brand] J.M. Porter) is a member of the phlox family (*Polemoniaceae*) (Figures 4.30 and 4.31). It is listed as endangered by the State of New Mexico, as a species of concern by the USFWS, and is a BLMFFO: Special Management Species. The Aztec gilia is a perennial with entire, sharp pointed leaves and pinkish to purple trumpet-shaped flowers, blooming from April to May. It occurs on erosional hills and ridges of the Nacimiento Formation in salt desert scrubland communities from 5,000 to 6,000 ft amsl. The species is endemic to San Juan County, in badlands near Aztec, Bloomfield, and Farmington (NMRPTC 2012). It favors hard-crusted soils of ridge and hill crests and upper slopes. Several areas of potentially suitable Nacimiento Formation soil habitat were documented during the course of the biological field surveys, including BPIs 38, 39, and 40 (Figures 4.10, 4.11, and 4.13), which correspond with the PJ 7 plant community.

BPIs 38, 39, and 40 and expanded easement areas near these BPIs were intensively surveyed for the Aztec gilia during the May flowering period to determine presence/absence of the species. These BPIs were intensively surveyed by pedestrian transects spaced no more than 5 m apart to cover the easement areas and buffer zones. A total of 11 locations with concentrations of the Aztec gilia were encountered and documented (BPIs 53-55, 57, 59-61, and 68-71; Figures 4.10, 4.11, 4.13, 4.30, 4.31, 4.34) between the BLM identified habitat (Parametrix 2012) and areas surveyed in the spring of 2013 by SEAS. The

Parametrix and SEAS intensive surveys resulted in the identification of 130+ Aztec gilia plants at the 11 BPIs. All of the Aztec gilia plants have been avoided in the SJBEC design and they will not be directly impacted. Effects to the Aztec gilia, as well other rare plant locations, will be avoided by implementation of EPMs 38, 39, and 40 and design standards developed for the SJBEC EIS (see Appendix A). These EPMs call for fencing off areas of sensitive species to avoid direct or incidental damage during construction. As specified in EPM 39, the final POD will include biological stipulations provided by the BLMFFO and USFWS, which will identify measures to avoid, minimize, or mitigate effects to special status species. Impacts from the project would be minimized to the fullest extent possible. In particular, special measures may be warranted at BPIs 54, 60, and 61 (Figures 4.10, 4.11, 4.31, and 4.34). BPIs 60 and 61 consist of one to two Aztec gilia plants each growing within 1 to 3 m of an existing road targeted for improvement during the SJBEC. These plants can be fenced and avoided and blading of the road will not be permitted in these two areas. For BPI 54, where 35+ Aztec gilia were identified, a new proposed access road passes within 5 m of an Aztec gilia plant. While this plant and BPI can be fenced and avoided, the highly erosive nature of the soil will likely be accelerated and the surrounding habitat may be degraded. Rutting will likely ensue from the bladed road cut, and increased channeling and sedimentation could spread to surrounding areas of the dissected badland terrain.

5.4.2 Brack Hardwall Cactus

The Brack hardwall cactus (*Sclerocactus cloveriae* Heil & Porter ssp. *brackii* Heil & Porter) is a member of the cactus family (*Cactaceae*) (Figures 4.32, 4.33, 4.35, and 4.36). It is considered endangered by the State of New Mexico, a Special Management Species by the BLMFFO, and is a USFWS species of concern. The small cactus typically has one stem, 13 ribs, 4 to 5 central spines with the lower one hooked, 6 to 7 radial spines, and purple tepals blooming in May. It grows on erosional hills and slopes derived from the Nacimiento formation in sparse shadscale desert scrubland communities. The species is endemic to San Juan County in suitable habitat between 5,000 to 6,000 ft amsl near Aztec and Bloomfield (NMRPTC 2012). It favors hard crusted soils and toe slopes. Brack hardwall cactus is very difficult to distinguish from the Clover's sclerocactus (*S. cloveriae*), of which it is a subspecies. Brack hardwall cactus only differs from Clover's sclerocactus by the reduced spination of juveniles, which persists into the early reproductive years, but intermediate plants are often found. Several areas of potentially suitable Nacimiento Formation soil habitat were documented during the course of the biological field surveys, including BPIs 38, 39, and 40 (Figures 4.10, 4.11, and 4.13), which correspond with the PJ 7 plant community.

BPIs 38, 39, and 40 and expanded easement areas near these BPIs were intensively surveyed for the Brack hardwall cactus during the May flowering period to determine presence/absence of the species. These BPIs were intensively surveyed for the Brack hardwall cactus by pedestrian transects spaced no more than 5 m apart to cover the easement areas and buffer zones. A total of nine locations with concentrations of the Brack hardwall cactus were encountered and documented (BPI's 53, 55, 56, 58, 62-64, 67, and 71) between the BLM identified habitat (Parametrix 2012) and areas identified by SEAS and surveyed in the spring of 2013 (Figures 4.10, 4.11, 4.13, 4.32, 4.33, 4.35, and 4.36). The Parametrix and SEAS intensive surveys resulted in the identification of 52 Brack hardwall cacti at the nine BPIs. All of the Brack hardwall cacti have been avoided in the SJBEC design and they will not be directly impacted. Effects to the Brack hardwall cactus, as well other rare plant locations, will be avoided by implementation of EPMs 38, 39, and 40 and design standards developed for the SJBEC EIS (see Appendix A). These EPMs call for fencing off areas of sensitive species to avoid direct or incidental damage during construction. As specified in EPM 39, the final POD will include biological stipulations provided by the

BLMFFO and USFWS, which will identify measures to avoid, minimize, or mitigate effects to special status species. Impacts from the project would be minimized to the fullest extent possible.

5.4.3 Knowlton Cactus

The Knowlton cactus (*Pediocactus knowltonii* L. Benson) is a member of the cactus family (*Cactaceae*) and listed as endangered by the USFWS and the State of New Mexico. The small cactus occurs as a solitary stem or a few in a cluster having ungrooved tubercles, minute radial spines (20 per areole), lacking central spines, and white to magneta flowers blooming in April and May. The Knowlton cactus is only known from one location near the Los Pinos River and Reese Canyon, northwest of Navajo Reservoir. It lives on rolling hills with gravelly to cobbly substrates with good lichen cover in piñon-juniper woodland and sagebrush vegetation at 6,200 to 6,300 ft amsl (NMRPTC 2012). Habitat suitable for the Knowlton cactus does not occur at the project site and the species has a very limited distribution. The project is not expected to impact the Knowlton cactus.

5.4.4 Mancos Milkvetch

The Mancos milkvetch (*Astragalus humillimus* A. Gray ex Brandegee) is a member of the pea family (*Fabaceae*) and is listed as endangered by the USFWS and the State of New Mexico. The plant is a tiny and tufted perennial that forms clumps. The flower is lavender to purplish with a conspicuous light spot in the throat of the corolla tube and blooming in late April to early May. The Mancos milkvetch lives in rimrock habitats formed in the Point Lookout Sandstone of the Mesaverde Group, particularly in sandstone depressions, ledges, and mesa tops. The Mancos milkvetch is endemic to San Juan County, New Mexico and Montezuma County, Colorado living between 5,000 to 6,000 ft amsl (NMRPTC 2012). Habitat suitable for the Mancos milkvetch does not occur in the project given the absence of the Mesaverde Group within the proposed transmission corridor and no Mancos milkvetch plants were observed. The project is not expected to impact the Mancos milkvetch.

5.4.5 Mesa Verde Cactus

The Mesa Verde cactus (*Schlerocactus mesae-verdae* [Boissevain *ex* Hill & Salisbury] L. Benson) is a member of the cactus family (*Cactaceae*) and listed as threatened under the ESA and endangered by the State of New Mexico. The cactus is a narrow endemic restricted to the region of extreme southwestern Colorado and northwestern New Mexico. While the badland habitat it is affiliated with is widespread in the region, the Mesa Verde cactus is rare within it and has an extremely sporadic distribution. The cactus typically has one, solitary pale green stem with 13-17 ribs, a much-branched taproot, 7-13 radial spines, usually lacking a central spine, and having yellowish-cream to pinkish flowers blooming in late April to May. The cactus often withdraws into the soil during dry periods and can be hidden by a thin layer of subsequent soil deposition until the return of a suitable moisture regime. The stems range from 1 cm to 15 cm, and the cactus can live up to 50 years or more. Multiple stem plants can be fairly common in some areas and may be the result of mechanical damage, such as trampling, or biological damage, such as infestations by the cactus borer/longhorn beetle (*Moneilema semipunctatum*) when the infestation is not fatal. This phenomenon is referred to in the literature as "sprouting" (Coles 2003). Multiple stemmed sprouts are often seen emerging adjacent to solitary dead stems. The cactus is a very slow growing species and can be long-lived. During years of "normal" precipitation, growth rates vary from only 1.4 mm to 2.6 mm a year (Ladyman 2004: 12).

The Mesa Verde cactus is affiliated with erosional and rolling, clay hills and slopes of residual and colluvial soils derived from the Mancos Shale and Fruitland Formation in sparse salt desert scrubland communities between 4,900 and 5,500 ft amsl (NNHPDFW 2008). However, the Sheep Springs population occurs in badlands of the Menefee Formation, and a population near Feather Hills appears to be growing on soils derived from the Gallup Sandstone. The rare cactus has a patchy distribution, which may be related to the variable lithography and chemistry of the Mancos Shale and Fruitland Formation substrates (Ladyman 2004). Gravelly Mancos Shale soils are often suitable and occupied habitat. The gravels may form a moisture microhabitat or refugia from trampling by livestock. The Mesa Verde cactus occupies an open high light environment and vegetation cover ranges from less than 5 to 15 percent. The associated plant community is generally desert scrubland or, less often, sparse desert grassland. Species most commonly associated with the cactus include mat saltbush (*Atriplex corrugata*), Gardner saltbush (*Atriplex gardneri*), shadscale (*Atriplex confertifolia*), budsage (*Artemisia spinescens*), and James' seaheath (*Frankenia jamesii*). Associated grasses may include galleta (*Hilaria jamesii*), alkali sacaton (*Sporobolus airoides*), New Mexico three-awn (*Aristida purpurea*), annual wheatgrass (*Eremopyrum triticeum*; an exotic species), and cheatgrass (*Bromus tectorum*; an exotic species). Forbs commonly associated with the Mesa Verde cactus consist of scorpionweed (*Phacelia* spp.), woolstar (*Eriastrum diffusum*), prince's plume (*Stanleya pinnata*), wild buckwheat (*Eriogonum salsuginosum*), globemallow (*Sphaeralcea coccinea*), and species of *Cryptantha*. Recently, due to periodic droughts, subsequent anthropod infestations (cactus borer beetle, army cutworm, and an unidentified species), and habitat loss to development, populations of the Mesa Verde cactus have suffered unprecedented mortalities, ranging from 25 percent in Colorado to 80 percent on Navajo Nation lands in northwestern New Mexico (NNHPDFW 2008; NMRPTC 2012; Ladyman 2004; and Coles 2003).

Several areas of potentially suitable Fruitland Formation soil habitat were documented during the course of the biological field surveys, including BPIs 29-32, 34, and 35, which correspond with the SDS 2 plant community (Figures 4.3 and 4.4). In addition, BPI 33 (Figure 4.3) is an area interfingered with potentially suitable Fruitland Formation residual soils. Somewhat small and marginal patches with potentially suitable encrusted residual soils occur sporadically within SDS 1 plant communities west of Piñon Mesa. These areas including expanded easement areas near these BPIs were intensively surveyed for the Mesa Verde cactus by SEAS in April and May of 2013 by pedestrian transects spaced no more than 5 m apart to cover the easement areas and buffer zones. No Mesa Verde cacti were observed during the survey. It should be noted that Parametrix conducted surveys for the Mesa Verde cactus in the corridor in 2012, as did Ecosphere in 2010. Habitat areas were identified by the BLMFFO and neither of these intensive surveys resulted in the identification of Mesa Verde cacti.

5.5 Migratory Bird and Non-Endangered Raptor Concerns

The MBTA (U.S. Code Title 16, Chapter 7, 703-712) implements the treaties that the U.S. has signed to protect birds that migrate across our national borders. The MBTA makes illegal the taking (killing), possessing, or selling of these protected bird species. On January 17, 2001, Executive Order 13186 was issued to instruct federal agencies to more fully implement the MBTA. In 2010, the BLMFFO issued interim management guidance in keeping with the intent of Exectutive Order 13186 in the absence of a National Memorandum of Understanding (MOU) with the USFWS. The interim guidance seeks to minimize unintentional take of migratory birds by BLM permitted activities and to enhance coordination and communication towards meeting the BLM's responsibilities under the MBTA. The emphasis of the interim guidance is on migratory bird species of special concern, incorporating existing bird conservation strategies when writing or revising land use planning documents, conserving migratory bird species by

enhancing habitat values that would benefit targeted migratory bird species and other wildlife, enhancing the role of NEPA in identifying potential effects to migratory bird populations, and considering management practices that would minimize identified impacts.

To comply with Executive Order 13186, the BLM consults with the Partners in Flight Conservation Plan and the USFWS regional lists of Birds of Conservation Concern. A review of Birds of Conservation Concern issued by the USFWS in 2008 for the Southern Rockies/Colorado Plateau Region (USFWS 2008: BCR 16, Table 14) and the Partners in Flight Bird Conservation Plans (Partners in Flight 2012) for the action area (Region 87, Colorado Plateau) was undertaken to produce a list of high priority migratory birds with potential to occur in the region (Table 5.4). Table 5.4 provides a list of high priority migratory bird species that occur in the region. Of the 34 priority migratory bird species with potential to occur in the Southern Rocky Mountain/ Colorado Plateau region, seven were identified during the biological field surveys, including the gray flycatcher (*Empidonax wrightii*), juniper titmouse (*Parus inornatus*), pinyon jay (*Gymnorhinus cyanocephalus*), white-throated swift (*Aeronautes saxatalis*), black-chinned hummingbird (*Archilochus alexandri*), golden eagle (*Aquila chrysaetos*), and prairie falcon (*Falco mexicanus*). The BLMFFO records show two golden eagle nests within 1/3 mile of the project area. The first is located on a cliff face approximately 1,520 ft south of the project area near Structure 235 (Figure 4.18). The nest is located on a cliff that faces southwest. As such, the proposed action is not likely to be visible from the nest. The second golden eagle nest is located on a cliff 967 ft north of SJCR 2300 (Figure 4.18). SJCR 2300 will be utilized for access to the project area but will not be improved or require additional ground disturbance. Vehicle activity along county Road 2300 from the proposed project will contribute very little to the existing vehicle activity in the area. BLMFFO is also aware of a prairie falcon nest just 758 ft west of the golden eagle nest above SJCR 2300 (Figure 4.18). The juniper titmouse, pinyon jay, and black-chinned hummingbird were observed numerous times within piñon pine/juniper woodland habitats. The white-throated swift occurs along cliffs intermittingly through the west side of the SJBEC. The gray flycatcher was identified near the confluence of Black Glade and Farmington Glade in desert shrubland habitat (DSHB 1) near the arroyo of Farmington Glade.

Many other species in the area are protected under the MBTA that are not considered priority migratory birds. As noted above, 58 bird species were observed during the fall biological survey of 2012 and during the rare plant surveys of spring 2013 (Table 4.4), all of which are protected under the MBTA. It should be noted that numerous other bird species are known to occur and nest in the area but were simply not encountered during the fieldwork due to the timing of the surveys. Virtually all native, resident bird species are currently protected under the MBTA, in addition to neotropical, arctic, coastal, and other avian migrants.

A variety of mitigation measures can alleviate MBTA concerns posed by the project. The proposed action would result in additional habitat loss and fragmentation for avian species protected under the MBTA. To minimize impacts to migratory birds nesting adjacent to or within the project area, it is recommended that construction work, including stringing of the power lines with helicopters, be completed during the non-breeding season (from August 1 to April 30) of each calendar year, when the majority of migratory birds nest. Given the length and size of the project, it is unlikely that Tri-State will be able to construct the proposed project in its entirety outside of the avian breeding season. Therefore, Tri-State would remove all nesting substrate and complete ground clearance where permitted outside of the breeding season to minimize nesting in construction areas. If areas cannot be entirely cleared outside of the breeding season, pre-construction surveys should be conducted and active nest sites flagged and

Table 5.4 Priority Migratory Bird Species With Potential to Occur in the Region

Migratory Bird Species of Priority Concern	USFWS Birds of Conservation Concern	Partners in Flight Bird Conservation Plans	Habitat Affiliation	Potential to Occur in Proposed Action
American bittern *Botaurus lentiginosus*	X		Riparian, Marsh/Wetland	Low
American peregrine falcon *Falco peregrinus*	X		Open Country, Cliff/Rock (Mountains to Coast)	High
Bald eagle *Haliaeetus leucocephalus*	X		Riparian, Large Lakes in Mountains and Open Country	High
Bells vireo *Vireo bellii*		X	Riparian	Low to moderate
Bendire's thrasher *Toxostoma bendirei*	X	X	Cold Desert Shrub	Moderate
Black-chinned hummingbird *Archilochus alexandri*		X	Pinyon-juniper	Observed
Black rosy finch *Leucosticte atrata*	X		Mountains, lowlands in Winter	Low to moderate in winter
Brewer's sparrow *Spizella breweri*	X		Sagebrush, Brushy Plains, Weedy Fields	Low to moderate
Cassin's finch *Carpodactus cassinii*	X		Coniferous Woodland/Forest	Moderate in wintertime
Cassin's kingbird *Tyrannus vociferans*		X	Pinyon-juniper	High
Chestnut collared longspur *Calcarius ornatus*	X		Plains/Prairies	No potential
Ferruginous hawk *Buteo regalis*	X		Plains/Prairies	Moderate
Flammulated owl *Otus flammcolus*	X		Coniferous Woodland/Forest	No potential
Golden eagle *Aquila chrysaetos*	X		Open Country and Mountains, Foothills, Plains	Observed
Grace's warbler *Dendroica graciae*	X	X	Coniferous Woodland/Forest	Low
Grasshopper sparrow *Ammodramus savannarum*	X		Plains/Prairies	Low
Gray flycatcher *Empidonax wrightii*		X	Pinyon-Juniper	Observed
Gray vireo *Vireo vicinior*	X	X	Pinyon-juniper	Low
Greater sage grouse *Centrocercus urophasianus*		X	Cold Desert Shrub	Low

Table 5.4 Priority Migratory Bird Species With Potential to Occur in the Region (Continued)

Gunnison sage grouse *Centrocercus minimus*	X	X	Cold Desert Shrub	Low
Juniper titmouse *Parus inornatus*	X	X	Pinyon-juniper	Observed
Lewis's woodpecker *Melanerpes lewis*	X	X	Coniferous Woodland/Forest	Low
Long-billed curlew *Numenius americanus*	X		Riparian, Marsh/Wetland within Plains/Prairies	Low
Mexican spotted owl *Strix occidentalis*		X	Coniferous Woodland/Forest	Low
Mountain plover *Charadrius montanus*	X	X	Semi-Desert Grasslands	Low
Prairie falcon *Falco mexicanus*	X		Plains/Prairies, Open Hills, Mountain Grasslands	Observed
Pinyon jay *Gymnorhinus cyanocephalus*	X	X	Pinyon-juniper	Observed
Sage sparrow *Amphispiza belli*		X	Cold Desert Shrub	High
Snowy plover *Charaddrius alexandrinus*	X		Sandy Beaches	No potential
Veery *Catharus fuscescens*	X		Deciduous Woodland	Low
Virginia's warbler *Vermivora virginiae*		X	Mountain Shrub/Chaparral	Moderate
Western burrowing owl *Athene cunicularia*	X		Plains/Prairies	High
White-throated swift *Aeronautes saxatalis*		X	Cliff/Rock	Observed
Willow flycatcher *Empidonax trailii*	X		Riparian	Moderate

avoided during construction. Tri-State will coordinate pre-construction nest surveys with the BLMFFO and USFWS if these conditions cannot be met. It should be reiterated that Tri-State will mark the transmission lines in both the La Plata River and the Animas River valleys to minimize avian collision, particularly for waterfowl.

6.0 Conclusions

The preliminary biological investigations for Tri-State's proposed SJBEC Project encountered a complex variety of potential concerns and issues regarding protected species, species of concern, and migratory and native avian species. The project area in New Mexico traverses a wide variety of geographical landscapes and, thus, potentially suitable habitat may be present for numerous rare plant and animal species. However, the landscape has been subject to extensive energy and other developments and a widespread network of roads, well pads, mines, pipelines, power lines, and other disturbances occur throughout the region. Given the diversity of biological resources in the region, the following section addresses recommendations for further biological work based on regulatory status, including ESA listed species, BLMFFO Special Management Species, rare plant and animal species of concern lacking formal regulatory status, and avian species protected under the MBTA. Recommendations for rare and protected avian species surveys are summarized in Table 6.1.

6.1 ESA ListedSpecies

6.1.1 ESA Listed Wildlife Species

Tri-State's SJBEC Project is not expected to impact the majority of protected species listed in Table 5.1 as suitable habitat is generally lacking within the proposed easement and access routes. Of the ESA-protected species, potentially suitable habitat is present in and adjacent to the project area for the SWWFC, yellow-billed cuckoo, black-footed ferret, and the Mesa Verde cactus. Suitable reproductive habitat for the SWWFC and yellow-billed cuckoo may be present at BPI 14 (Figures 4.10 and Figure 5.1), although the riparian and wetland habitats will not be modified and the SJBEC Project is not expected to impact those species. BPI 14 (the La Plata River channel and floodplain) will be spanned between Structures 96 and 97. Provided the stringing of lines by helicopter and construction activities at Structures 96 and 97 do not occur during the breeding season (May 1 to August 31), the project is not expected to impact the Southwestern willow flycatcher or yellow-billed cuckoo. If stringing of the power line by helicopter is necessary during the nesting season, pre-construction USFWS protocol Southwestern willow flycatcher and yellow-billed cuckoo surveys should be implemented and further action would be contingent upon the survey results in consultation with the USFWS and BLMFFO.

Potentially suitable habitat for the black-footed ferret is present within the large, 1175-acre Gunnison's prairie dog complex at the west end of the project area from Structures 1 to 5, where it extends north to northwest. In addition, the prairie dog colonies at BPI 22 and 23 are over 200 acres in size. Black-footed ferrets are considered extirpated in New Mexico, with the last confirmed sighting in 1934. However, the USFWS and BLMFFO require that the USFWS black-footed ferret survey protocol be implemented for Gunnison's prairie dog colonies over 200 acres prior to approval of federal actions. Therefore, a pre-construction black-footed ferret USFWS protocol survey will be required by the BLMFFO within the identified suitable habitat (Structures 1 to 5, BPI 22, and BPI 23; Figures 4.4 and 4.5) by a qualified biologist in the spring of the year construction is to occur. In consultation with the USFWS and BLMFFO, the results of the surveys would determine if mitigation measures are necessary.

Environmental protection measures, including drafting and implementing a stormwater pollution prevention plan (SWPPP) and other efforts, would minimize any potential direct and indirect short-term effects to Colorado pikeminnow, razorback sucker, and roundtail chub that could result from increased

soil erosion (and possible sediment impairment in the lower La Plata, Animas, and middle and lower San Juan Rivers) due to vegetation removal and increased runoff from roadway grading activities and construction.

6.1.2 ESA Listed Plant Species

BLM identified potential Mesa Verde cactus habitat area between the existing Shiprock Substation and San Juan Coal Mine, which was surveyed by Ecosphere Environmental Services in 2010 and Parametrix in 2012. These efforts identified no Mesa Verde cactus in the SJBEC Project area. Potentially suitable habitat was also noted at BPIs 29-35 (Figures 4.3 and 4.4) and in small, marginal areas of encrusted residual soils within the salt-desert scrubland vegetation communities west of Piñon Mesa. SEAS surveyed these areas in late April and May of 2013 and did not identify any Mesa Verde cactus in the project area.

6.2 BLMFFO Special Management Species

6.2.1 Wildlife Special Management Species

Several avian species with BLMFFO Special Management Species status have potential to occur in the project area and include the ferruginous hawk, golden eagle, peregrine falcon, prairie falcon, and Western burrowing owl. The prairie falcon was observed during the field surveys. For the ferruginous hawk, golden eagle, falcons, as well as other non-endangered hawks and falcons (e.g., the red-tailed hawk, sharp-shinned hawk, Northern harrier, merlin, and American kestrel) with potential to nest within or adjacent to the project area, it is recommended that in the year prior to construction a nesting raptor survey be conducted by a qualified biologist with high-powered optics in potentially suitable nesting habitat within a 1/3-mile radius of the project area. This is consistent with standard Tri-State practices, which require pre-construction nesting raptor surveys. More specific management recommendations would be contingent upon the nesting raptor survey results. The BLMFFO would then determine if construction could proceed or if mitigation measures, or avoidance periods, are necessary in specific areas. The BLMFFO regularly monitors known raptor nest sites as well and has agreed to share that information with Tri-State's consulting biologists. Avoidance periods begin earlier for raptors than most avian species. For the golden eagle the avoidance period February 1 through June 30th; for peregrine and prairie falcons, March 1 through June 30; and for the Western burrowing owl, April 1 through August 15. If nesting raptor sites are located, on a case-by-case basis, the avoidance period would end when the chicks have been confirmed to be fledged by the employed nest monitors. The Western burrowing owl may nest until August 15 and in some instances, may raise two clutches in one season.

The active or vacant Gunnison's prairie dog colonies identified within and adjacent to the project area are considered suitable reproductive habitat for the Western burrowing owl. Disturbance from pole construction should be kept to a minimum within the identified prairie dog colonies and avoided altogether when feasible. Three previous Western burrowing owl nests are known by the BLMFFO near the north end of CR 6500, a road that will be utilized to access the SJBEC. The BLMFFO requires pre-construction Western burrowing owl nest surveys for construction activities within potential habitat during the April 1 to August 15 nesting season. Occupied burrowing owl nests are not to be disturbed within a 50-meter radius from April 1 to August 15, and sometimes BLMFFO requires avoidance by 100 m depending on the specific circumstances. After August 15, any project that will destroy a nest burrow can only begin once vacancy is confirmed. Therefore, it is recommended that, in addition to the known

nests sites, all prairie dog colonies identified by the project biologists and BLMFFO within and adjacent to the project area be surveyed with high-powered optics during the burrowing owl breeding season in the year just prior to construction. More specific management recommendations concerning raptors would have to await the survey results and subsequent consultations with BLMFFO biologists.

6.2.2 Plant Special Management Species

Two BLMFFO Special Management Species, the Aztec gilia and the Brack hardwall cactus, have potential to occur in the project area, albeit in a restricted area. Both of these rare plants are specifically affiliated with encrusted badland soils derived from the Nacimiento Formation. Some of these rare plant surveys were already conducted in spring of 2012 in areas identified by the BLMFFO (Parametrix 2012), although slight deviations in the alignment have occurred since that time and these areas, in addition to other habitat identified by the BLM and SEAS, were also intensively surveyed in May of 2013 by SEAS.

Between the 2012 Parametrix survey and the 2013 SEAS survey, 11 locations (BPIs 53-55, 57, 59-61, and 68-71) with concentrations of Aztec gilia and nine locations (BPI's 53, 55, 56, 58, 62-64, 67, and 71) with Brack Hardwall cacti were encountered and documented (Figures 4.10, 4.11, 4.13, and 4.30-36. Three of these locations (BPIs 53, 55, and 71) contain both Aztec gilia and Brack hardwall cacti. Within the SJBEC project area and 50-foot buffer zone, a total of 130+ Aztec gilia plants and 52 Brack hardwall cacti were identified and documented. All of the identified Aztec gilia and Brack hardwall cacti have been in avoided in the SJBEC design and will not be directly impacted by the project. Effects to the Aztec gilia and Brack hardwall cactus, as well other rare plant locations, will be avoided by implementation of EPMs 38, 39, and 40 and design standards developed for the SJBEC EIS (see Appendix A). These EPMs call for fencing off areas of sensitive species to avoid direct or incidental damage during construction. As specified in EPM 39, the final POD will include biological stipulations provided by the BLMFFO and USFWS, which will identify measures to avoid, minimize, or mitigate effects to special status species. Impacts from the project would be minimized to the fullest extent possible. Specifically, special measures may be warranted at BPIs 54, 60, and 61 (Figures 4.10 and 4.11) for the Aztec gilia. BPIs 60 and 61 consist of one to two Aztec gilia plants each growing within 1 to 3 m of an existing road targeted for improvement during the SJBEC. These plants can be fenced and avoided and blading of the road will not be permitted in these two areas. For BPI 54, where 35+ Aztec gilia were identified, a new proposed access road passes within 5 m of an Aztec gilia plant. While this plant and BPI can be fenced and avoided, the highly erosive nature of the soil will likely be accelerated and the surrounding habitat may be degraded. Rutting will likely ensue from the bladed road cut, and increased channeling and sedimentation could spread to surrounding areas of the dissected badland terrain. More specific management recommendations may be contingent upon consultations with the BLMFFO. Tri-State will provide dust protection for plant species of concern located proximal to proposed construction to reduce fugitive dust impacts.

6.3 Species of Concern

6.3.1 Wildlife Species of Concern

Three of the animal species of concern listed in Table 5.2 were observed in the project area, and include the Gunnison's prairie dog, loggerhead shrike, and prairie falcon. Several other sensitive animal species listed in Table 5.2 with high potential to occur in the area were not observed during the survey, including the big free-tailed bat, little brown myotis bat, long-eared myotis, pinyon jay, Townsend's big-eared bat,

and Yuma myotis, although the survey timing was not conducive to their detection. Suitable reproductive habitat for these species is primarily restricted to canyon terrain along the northern tier of the project, with the exception of the pinyon jay, which can occur in all woodland habitats of the project area and they are often prolific in the region. The loggerhead shrike and pinyon jay are not expected to be impacted by the project as they are subject to the MBTA protections discussed above in Section 5.5.

For the bat species of concern, they are considered very vulnerable to disturbance during the April to end of June period when females gather in maternal colonies to raise their young. Ledge and cliff habitat are the primary areas sensitive bat species of concern may occur. This habitat type is exposed intermittingly along the northern tier of the project area and several areas between Piñon Mesa and Westwater Arroyo to the west (specifically Structures 18-22; 37-42; 46-50; 61-69; 201-203; 215; and 231-243). Small piles of bat guano were found on several occasions in these ledge and cliff zones during the field surveys. As the ledge and cliff zones, in particular, should be avoided by construction from April to the end of July due to the many MBTA concerns, bat species would benefit during their summer period of vulnerability by the MBTA recommendations. Bat species would also benefit from protection of active cliff-dwelling raptor nests as well. However, as previously stated, given the length and size of the project, it is unlikely that Tri-State will be able to construct the proposed project in its entirety outside of the avian breeding season.

6.3.2 Plant Species of Concern

None of the rare plant species of concern evaluated in Table 5.3 were identified within the project during the late fall 2012 survey, although two of these species were observed during the spring of 2013 rare plant surveys. Late fall surveys are typically not conducive to plant identification and most of these rare plants need to be in flower or fruit to positively identify. Potentially suitable habitat occurs in the project area for several plant species of concern lacking formal regulatory status, including the Bisti fleabane, Bolack's sand verbena, Cottam's milkvetch, Mancos saltplant, Naturita milkvetch, and San Juan milkweed. BLMFFO did not require species-specific surveys for plant species of concern. However, the BLMFFO requested that Tri-State's contractor record any incidental occurrences of sensitive and rare plant species identified in areas targeted for intensive survey of special status plants species.

Incidentally encountered sensitive rare plants lacking formal regulatory status that were identified in the project during the 2013 rare plant surveys include one Naturita milkvetch (*Astragalus naturitensis*) location (BPI 45; Figures 4.3 and 4.27) with two plants and three probable Cottam's milkvetch (*Astragalus cottamii*) locations (BPIs 46, 47, and 65; Figures 4.3 and 4.6) with 13 plants. A San Juan milkweed (*Asclepias sanjuanensis*) plant (BPI 66; Figure 4.3) was also identified by Parametrix in 2012. These locations for the Naturita milkvetch, Cottam's milkvetch, and San Juan milkweed have been spanned and will not be directly impacted by the SJBEC. Effects to these rare plants will be avoided by implementation of EPMs 38, 39, and 40 and design standards developed for the SJBEC EIS (see Appendix A). These EPMs call for fencing off areas of sensitive species to avoid direct or incidental damage during construction. As specified in EPM 39, the final POD will include biological stipulations provided by the BLMFFO and USFWS, which will identify measures to avoid, minimize, or mitigate effects to special status species. Indirect effects of the project would be minimized to the fullest extent possible.

It should be noted that both Bolack's sand verbena and the Bisti fleabane were found to be common to abundant in the same Nacimiento Formation soil habitats surveyed for the Aztec gilia and Brack hardwall cactus in the spring of 2013. However, the NMRPTC has recently dropped the Bisti fleabane from the

Table 6.1 Migratory Bird and Bird Species of Concern Construction Avoidance/Survey Periods

Avian Species of Endangered Species Act Status With Potential to Occur in the Project Area												
	Jan	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Southwestern willow flycatcher (ESA Endangered) (BPI 14 only)												
Yellow-billed cuckoo (BLM: SMS and ESA Candidate) (BPI 14 only)												
Avian Species with BLMFFO Special Management Species Status With Potential to Occur in the Project Area												
	Jan	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Golden eagle (BLM: SMS)												
Peregrine falcon (BLM: SMS)												
Prairie falcon (BLM: SMS)												
Western Burrowing Owl (BLM: SMS)												
MBTA Protected Avian Species												
	Jan	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Migratory and Native Birds Protected under MBTA												

New Mexico Rare Plant List citing it is actually the same species as the basin daisy (*Erigeron pulcherrimus*). Similarly, the NMRPTC is in the process of dropping Bolack's sand verbena from the New Mexico Rare Plant List as some evidence suggests it may be the elliptic-leaved sand verbena (*Abronia elliptica*). Regardless of the taxonomic implications, these two species were found in the same Nacimiento habitats as the Aztec gilia and Brack hardwall cactus. The SJBEC design has minimized

impacts to the Nacimiento soil habitats to the fullest extent possible and the Bolack's sand verbena and Bisti fleabane, if they are actually distinct species, are unlikely to be significantly impacted by the project.

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Appendix A:

List of Environmental Protection Measures (EPMs)

Exhibit

Environmental Protection Measures and Design Standards

No.	Topic	Description of Measure	Phase
Project Design, Transportation and Access, and Construction			
12	Construction, Access	All construction access outside the right-of-way will be restricted to pre-designated access, contractor-acquired access, or public roads.	C, O
13	Construction, general	Stream and waterway crossings will be designed to minimize effects to surface waters and to ensure the long-term viability of the crossing in compliance with federal, state, and local regulations. All construction and maintenance activities will be conducted in a manner that will minimize disturbance to vegetation, drainage channels, and stream banks. All existing roads will be left in a condition equal to their condition prior to the construction of the transmission line. Towers will be sited with a minimum distance of 200 feet from perennial streams wherever possible.	P, C

P = Pre-construction, C=Construction, and O = Operation

Project Design, Access, and Construction (Continued)			
16	Construction, restoration	Tri-State or its contractors would repair or reconstruct existing roads or trails if they were damaged by construction activities associated with the SJBEC Project.	C, O
17	Construction, restoration	In construction areas where ground disturbance is substantial or where recontouring is required, surface restoration will occur as required by the landowner or land management agency for erosion control. The method of restoration will normally consist of, but not be limited to, returning disturbed areas back to their natural contour, reseeding (if required), installing cross drains for erosion control, and placing water bars in the road. All areas on BLM lands that are disturbed as a part of the construction or maintenance of the proposed transmission line will be seeded, to 70 percent of existing cover, where practicable, with a seed mixture appropriate for those areas. The BLM will prescribe a seed mixture that fits each range site.	C, O

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Groundwater, Surface Water, and Wetlands			
21	Surface water, drainage crossings	If necessary, low water crossings will be designed and constructed in a manner that will prevent any blockage or restriction of the existing channel.	P, C, O
22	Water quality	A buffer strip of vegetation, width determined on a case-by-case basis, will be left between areas of surface disturbance and riparian vegetation.	P, C, O
23	Water quality	Tri-State will identify all streams in the vicinity of the proposed project sites that are listed as impaired under Section 303(d) of the CWA and will develop a management plan to avoid, reduce, or minimize adverse effects to those streams if the SJBEC Project could affect these areas.	P
24	Water quality	Runoff from excavated areas, construction materials or wastes (including truck washing and concrete washes), and chemical products such as oil, grease, solvents, fuels, and pesticides will be controlled and contained. Excavated material or other construction material will not be stockpiled or deposited near or on stream banks, ditches, irrigation canals, or other areas where runoff could affect the environment.	C
25	Water quality	Washing concrete trucks or disposing excess concrete in any ditch, canal, stream, or other surface water will not be permitted. Concrete wastes will be disposed of in accordance with all federal, state, and local regulations.	C
26	Wetlands	Transmission structures and access roads will be routed outside of wetland areas	P, C

Exhibit

Environmental Protection Measures and Design Standards

No.	Topic	Description of Measure	Phase
		to the greatest extent feasible.	

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Vegetation and Soils Management			
27	Reclamation and noxious weeds	The Final POD will include a reclamation and noxious weed management plan, which will be approved by the appropriate agency prior to the issuance of a right-of-way grant. The noxious weed management plan will be developed in accordance with appropriate land management agencies' standards, consistent with applicable regulations and agency permitting stipulations for the control of noxious weeds and invasive species (Executive Order 3112). Included in the noxious weed plan will be stipulations regarding construction, restoration, and operation.	P, C, O
28	Vegetation and soil, construction	Clearing, grading, and other disturbance of vegetation and soil will be limited to the minimum area required..	C, O
29	Vegetation, construction	In construction areas where recontouring is not required, vegetation will be left in place wherever possible, and original contour will be maintained to avoid excessive root damage and allow for resprouting.	C
30	Vegetation	For safe operation of the transmission line, vegetation removal will be limited to areas that would create a threat to the electrical reliability of the transmission line or would impede access to the line for safe operations. Except for dangerous vegetation, which is defined as vegetation that could grow in, fall in, blow in, or be a fuel loading hazard in the right-of-way, no clearing would be performed outside of the limits of the right-of-way.	O
31	Vegetation, removal	Clearing will be performed so as to minimize marring and scarring the countryside and to preserve the natural beauty to the maximum extent possible.	C, O
32	Vegetation, treatment	Use of pesticides and herbicides shall comply with applicable federal and state laws.	C, O
33	Soils, drainage and erosion control	A SWPPP will be prepared for the SJBEC Project and will be included as part of the Final POD. Implementation of the SWPPP will manage erosion and provide adequate drainage around structure and tower sites. Excavated material will be spread around the site from where it was excavated.	C, O
34	Soils, construction	No construction or routine maintenance activities will be performed when the soil is too wet to adequately support construction equipment. If such equipment creates ruts in excess of 6 inches deep, the soil will be deemed too wet to work.	C, O
35	Soils, construction	Grading will be minimized by driving overland within work areas whenever possible.	C, O
36	Soils, restoration	In newly disturbed temporary work areas, the soil will be salvaged and will be distributed and contoured evenly over the surface of the disturbed area after construction is completed. The soil surface will be left rough to help reduce potential wind erosion.	C, O
37	Soils, restoration	Topsoil removed during construction will be stockpiled and used in reclamation.	C

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Exhibit

Environmental Protection Measures and Design Standards

No.	Topic	Description of Measure	Phase
Biological Resources			
38	Biological, special status species	Special status species or other species of particular concern will be considered in accordance with management policies set forth by appropriate land-management agencies. This will entail conducting surveys for plant and wildlife species of concern along the proposed transmission line route and associated facilities as agreed upon by the responsible land-management agencies. In cases where such species are identified, appropriate action will be taken to avoid adverse effects to the species and its habitat and may include monitoring and altering the placement of roads or towers, where practicable.	P, C, O
39	Biological, special status species	The Final POD will include a biological stipulations provided by the BLM and the USFWS, which will identify measures to avoid, minimize, or mitigate effects to special status species..	P, C, O
40	Biological, special status species	Prior to the start of construction, Tri-State will provide training to all contractor and subcontractor personnel and others involved in construction activities where there is a known occurrence of protected species or habitat in the construction area. Sensitive areas will be considered avoidance areas. Prior to any construction activity, avoidance areas will be marked on the ground and maintained through the duration of the contract. Tri-State will remove markings during or following final inspection of the project.	P, C
41	Biological, special status species	If evidence of a protected species is found in the project area, the contractor will immediately notify the appropriate land management agencies and provide the location and nature of the findings. The contractor will stop all activity within 200 feet of the protected species or habitat.	C
42	Biological, special status species	Tri-State will comply with any and all environmental protection and mitigation measures identified by the USFWS, BLM, BIA, and SUIT in the Section 7 consultation, regarding federally listed, candidate, proposed species.	P, C, O
43	Biological, migratory birds	Given the scope of the proposed project, it is likely that avoiding construction during the avian breeding season is not possible. Prior to construction during the avian breeding season, Tri-State will coordinate appropriate mitigation measures with the BLM, BIA, SUIT, and USFWS.	P, C

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Exhibit

Environmental Protection Measures and Design Standards

No.	Topic	Description of Measure	Phase
Biological Resources (Continued)			
44	Biological, wildlife	Seasonal restrictions may be implemented in certain areas to mitigate effects to wildlife. With the exception of emergency repair situations, right-of-way construction, restoration, maintenance, and termination activities in designated areas will be modified or discontinued during sensitive periods (such as nesting and breeding periods) for candidate, proposed threatened and endangered, or other sensitive animal species, as required by permitting and land management agencies. The Final POD will incorporate the seasonal restrictions and stipulations contained in the ROD. A seasonal restriction of November 1st through March 31st will be implemented for the bald eagle roost located near the Iron Horse substation. Other seasonal restrictions include: • Migratory Birds – May 1st through July 31st • Southwestern Willow Flycatcher and Yellow-Billed Cuckoo – May 1st through August 31st • Peregrine and Prairie Falcons – March 1st through June 30th • Golden Eagle – February 1st through June 30th • Western Burrowing Owl – April 1st through August 15th	P, C, O
45	Biological, wildlife and livestock	Tri-State will repair holes created by construction of transmission structures to avoid and minimize effects to wildlife and livestock	C
46	Biological, raptors	The transmission line design will consider the Avian Power Line Interaction Committee's suggested practices for avian protection on power lines.	P, C
47	Biological, raptors	Tri-State will follow BLM, Colorado Parks and Wildlife, and USFWS guidelines for raptor protection during the breeding season (Migratory Bird Executive Order 13186, January 10, 2001).	P, C, O
Hazardous Materials, Waste, and Wastewater Management			
78	Storage and removal	Tri-State will provide a Hazardous Materials Management Plan. Hazardous material shall not be drained onto the ground or into streams or drainage areas. Totally enclosed containment would be provided for all trash. All construction waste, including trash and litter, garbage, other solid waste, petroleum products, and other potentially hazardous materials would be removed to a disposal facility authorized to accept such materials.	C, O
79	Hazardous materials, vehicles	Vehicle refueling and servicing activities would be performed in the right-of-way or in designated construction zones located more than 300 feet from wetlands and streams. Spill preventative and containment measures or practices would be incorporated as needed.	C, O
80	Hazardous materials, spills	Tri-State will provide a spill prevention notification and cleanup plan. The SJBEC Project will comply with all applicable federal, state, and local regulations, and will include: spill prevention measures, notification procedures in the event of a spill, employee awareness training, and commitment of manpower, equipment, and materials to respond to spills, if they occur.	P, C, O

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